PEST CONTROL

MARCH 1960

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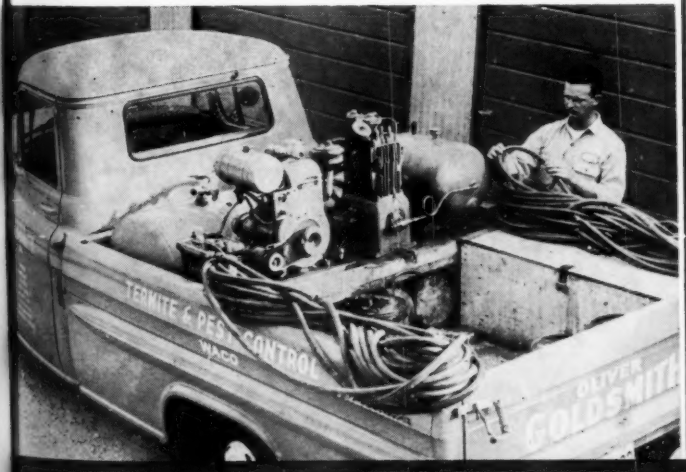
For use where Public Health is involved

Floating Fumigation Job Pg. 60

Portrait of a Texas PCO Pg. 56



Conference Reports

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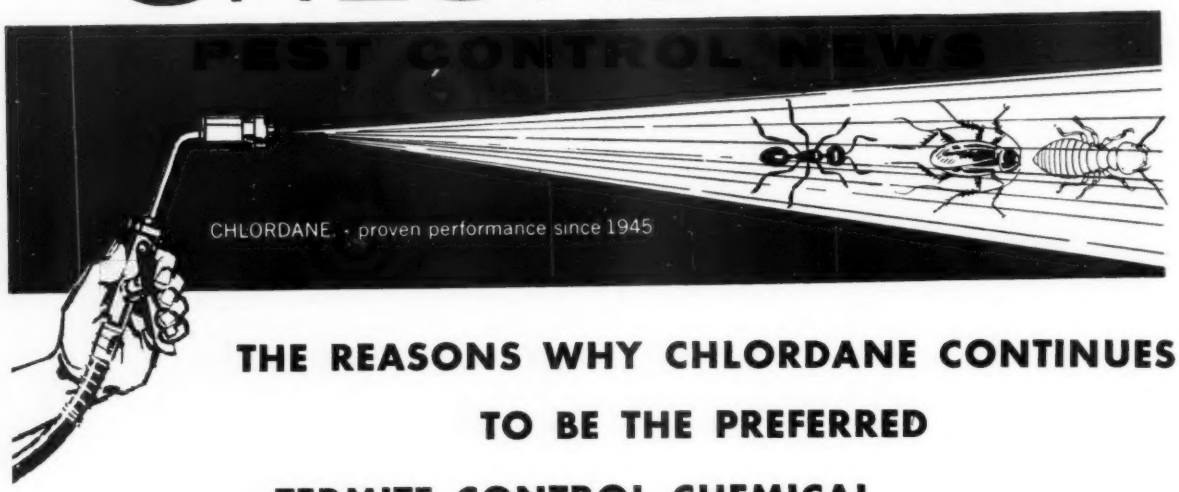
Southern . . Pg. 32
Eastern . . . Pg. 38
Purdue . . . Pg. 44

Monthly Magazine of Methods, Chemicals, and Equipment for Urban and Industrial Pest Control and Sanitation Since 1933

CHLORDANE



THE REASONS WHY CHLORDANE CONTINUES TO BE THE PREFERRED TERMITE CONTROL CHEMICAL

FACTS ABOUT CHLORDANE—It's been so long since Chlordane was an "amazing new discovery" that most of its advantages are well known in the pest control industry. But from time to time, we like to repeat the facts to show why Chlordane is so much better than any other termite control chemical developed before or since.

DOES NOT REQUIRE HIGH AROMATIC SOLVENT
Technical Chlordane is a liquid. The solvent used in formulating Chlordane is deodorized kerosene, which results in four important benefits:

1. Less damage to hoses, connections, diaphragms, etc.
2. Less chance of burning plants or turf.
3. Practically no solvent odor.
4. More concentrated formulations (up to 8 lbs. per gallon). This greatly reduces storage and handling.

LONGER RESIDUAL CONTROL—In actual use, under varying soil and climatic conditions, Chlordane applications made in 1946 are still providing 100% effective control. In official tests, applications of Chlordane made in 1948, at a dosage of .5%, are still 100% effective today! In terms of your business, this means longer control at minimum dosages, fewer retreats, and greater customer satisfaction.

STABILITY—Chlordane is stable in all soils, including those that are highly alkaline. In tests, Chlordane remained stable the equivalent of nineteen years in a soil too alkaline to support vegetation!

NON-CRYSTALLINE—Chlordane is a viscous substance. It coats each soil particle, and will not crystallize out of the kill zone. This is one reason why Chlordane has the longest proven residual action in the soil.

NO UNPLEASANT ODOR—Chlordane, technical and formulated, has a non-offensive odor. This is something PCO's appreciate when they're working in confined spaces, and something their customers appreciate at all times.

SAFE—Chlordane's safety record is unmatched. It has not only proven safe in the pest control industry, but also has proven safe in millions of industrial lawn and garden applications.

ECONOMICAL—Chlordane's economy looks mighty good in your profit picture. At the Building Research Advisory Committee recommendation of 1%, Chlordane combines low cost with long lasting termite control protection.

ACTIVELY PROMOTED—Chlordane in small package form is actively promoted to consumers for lawn and garden use. In addition all consumer ads now carry a plug for PCO's. The name alone is a plus selling feature for you. In addition, Chlordane furnishes a wide range of direct promotional support to PCO's, including streamers, mailing pieces, films, scripts, display items, and technical information.

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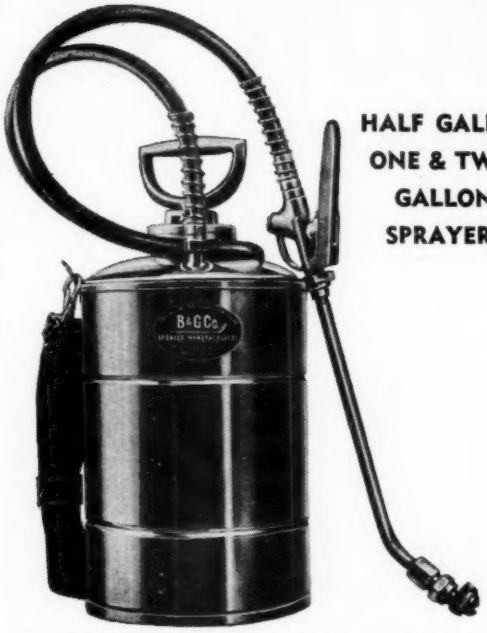
... interested in your success!
INTERNATIONAL REPRESENTATIVE: VELSICOL INTERNATIONAL CORPORATION, C.A., P. O. BOX 1687, NASSAU, BAHAMAS, B. W. I.

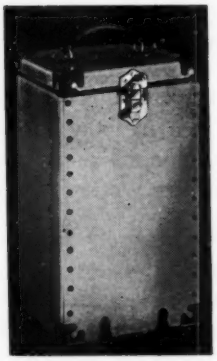
PROFESSIONAL *B&G* EQUIPMENT MEETS EVERY PCO NEED . . . BETTER!



HALF GALLON ONE & TWO GALLON SPRAYERS

Designed Especially for PCO Work, these lightweight units have precision nozzles, oil and chemical resistant hose, electrically seam welded tanks, quick-acting shut-offs. Fully guaranteed!

Fitted Repair Box and Parts Kit
Sturdy, Permanent box. Over 90 tools. Specify sprayer size and type shut-off when ordering.



Sprayer Carrying Case
Vulcanized fibre, double reinforced bottoms, steel corners, draw-bolt catch. 1 or 2 Gal. Sizes.

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B&G "BAN-DRIP" GUN

PERMANENTLY DRIP-PROOF

Cuts off quick and clean after 16,000 field tests*

Guaranteed drip-proof forever, and it's easier to use because the hose connects to the butt instead of to the nozzle, eliminating interference.

REVOLUTIONARY NEW DESIGN

- Only five simple parts, including built-in strainer and two easily replaceable gaskets. No skill needed to change gaskets.

REVOLUTIONARY NEW MATERIALS

- Frame and trigger of unbreakable, rustproof Fiberglas. Lasts a lifetime—light in weight for easier handling.
- All parts in contact with chemicals are brass or stainless steel; will not rust or corrode.
- Washers of tough, chemically-inert Teflon — cannot deteriorate.
- Valve Rod and chemical tube are of non-corrosive stainless steel.
- Contains no aluminum or other parts which can pit, rust, corrode or deteriorate.

* FIELD - TESTED ON THE JOB FOR 4 MONTHS — Six B & G "BAN-DRIP" GUNS were tested in actual on - the - job operations, a total of over 16,000 continuous tests. Not a single drip occurred, and not a single replacement was necessary.

B&G COMPANY

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DIAZINON 2D

(2% DUST)

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- **Economical**
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Geigy ORIGINATORS OF DDT INSECTICIDES

GEIGY AGRICULTURAL CHEMICALS DIVISION OF GEIGY CHEMICAL CORPORATION **SAW MILL RIVER ROAD, ARDSLEY, NEW YORK**

PEST CONTROL

MARCH, 1960

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Have Any Doubts?

In each of the past ten years, the pest control industry has realized an average growth of better than 10% in dollar volume. In 1950, official estimates were that the industry did $100 million annually. In that year, a *Pest Control* survey revealed about 11,000 service employees were engaged by PCO firms.

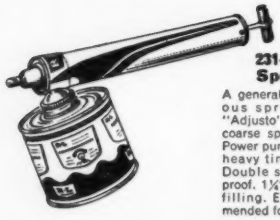
Now, ten years later, come some new statistics furnished by Dr. Ralph E. Heal, NPCA executive secretary. He reports, "The structural pest control service industry has grown considerably over recent years in size, in volume of business, in public acceptance, and in the number of qualified men employed in it."

Dr. Heal estimates there are now from 15,000 to 20,000 service personnel in this field. Annual volume of business is $225,000,000, he says. Of this, 40 percent, or about $90,000,000, is derived from pre- and post-construction termite work alone.

The public spends $100,000,000 or more for insecticides sold retail, and nearly twice that much is spent for community mosquito control. No figures are available on the number of dollars paid out for control of weeds and ornamental pests, but an educated guess would be better than $50 million. Community and area rat control costs in excess of $50,000,000.

Eliminating the estimate for weed and ornamental pest control, the number of dollars spent each year for control of insect and rodents in the USA is in the neighborhood of $575 million.

These figures should permanently dispel the arguments of any skeptics who think urban and industrial pest control is a piddling business. They should also prove more money needs to be spent on research to find better control chemicals and methods.

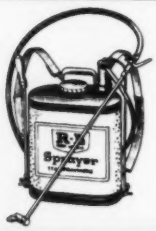


231—Continuous Sprayer

A general purpose continuous sprayer with new "Adjusto" nozzle for fog or coarse spray. Patented Nu-Power pump, 1½" x 13", 1 qt. heavy tinplate container. Double seamed and leakproof. 1½" opening for easy filling. Especially recommended for resale.

276—Seal-Tight® Sprayer

4 gallon capacity, corrosion-resistant stainless steel tank, with exclusive Seal-tight locking cover and electrically welded seams. Easy stroking 1¾" x 15½" seamless brass pump. 42" oil and chemical-resistant hose, rotatable shut-off, 24" brass extension with exclusive Revolvo® nozzle that turns full circle.



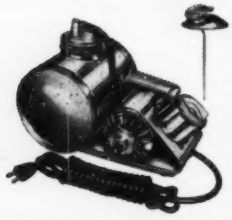
77SA—Napsak® Sprayer

5 gallon stainless steel sprayer with a positive piston stainless steel pumpdeveloping pressures up to 100 lbs. Tank back has double wall for greater comfort. Dasher agitator keeps solution well mixed. Use with any spray material. Pump handle can be mounted right or left. 5 ft. hose, fully rotatable shut-off, 24" brass extension with exclusive Revolvo® nozzle.

Root-Lowell Sprayers and Dusters One Source for All Your Needs

903 PRO® —Chemical Duster

A dust applicator of proved performance for effective kill of burrowing pests. Powerful pump provides high volume air blast, high penetration. Aluminum container holds one pound of dust. Cut-off features permit dispersal of air-dust mixture or air only. Clip fixes handle for carrying. Hose ¾" dia. by 3 ft. long. Pump is 14" x 3¾".

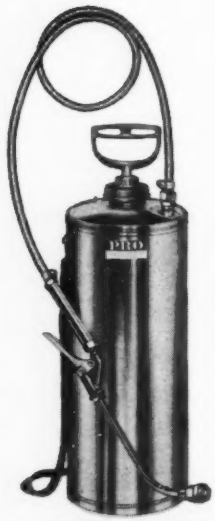


304—Thoro-Spray® Electric Sprayer

3 qt. stainless steel tank, automatic time switch, dual purpose nozzle for residual or atomized mist spray. Includes extra 4-jet Atomist® spray head for greater kill of flying insects. Will handle any liquid insecticide, disinfectant or deodorant. Discharges about 1 oz. per minute.

63030—Spraycat® Power Sprayer

30 gallon tank with single piston pump that has new spring-loaded poppet valve with nylon discs and seats, extremely tough, almost wearproof against agricultural chemicals. New Jet-O-Matic® agitation. Handles all sprayable solutions. Available, gasoline or electric powered models. Rolls easily on pneumatic tires. Other models from 15 to 150 gal. capacity.



908 PRO®—Stainless Steel Sprayer

Stainless steel tank, 2 gallon usable capacity. 1¾" x 15½" seamless brass pump easily removed for fast filling. Positive dripless nozzle shut-off. 4 ft. hose with exclusive steel braided hose cover and vinyl tubing finer. Shut-off has easy clean Monel strainer. 9" angled extension with fan-pattern nozzle quickly removed from shut-off valve housing.

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With Root-Lowell PRO Sprayers, the professional Pest Control Operator does a faster, neater job, steps up efficiency and reduces operating expense. PRO sprayers are designed expressly to P.C.O. requirements with operating features and quality unique in today's market.

Over fifty years manufacturing experience makes Root-Lowell a real "Pro" in the sprayer and duster field. Write today for our Catalog #90 published exclusively for the Pest Control Operator, featuring PRO® sprayers and other selected, market-tested Root-Lowell sprayers and dusters best suited to the professional operator for both use and re-sale purposes.

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Letters

Four Foot Bridge

After seeing, on page 36 of your November '59 issue, the example of termites spanning the free space from ground to floor rafters, I would like to submit a picture of a similar case in lower Delaware. The photo shows termites have bridged a gap of at least four feet from ground to the joists. Photo was taken under a building in Georgetown, Delaware.

Edward B. Green

E. B. Green Exterminating Service
Georgetown, Dela.

Asks for Retraction

On page 34 of your December 1959 issue, in a story regarding the Florida Exterminators Association, you have listed me as a second vice-president of the organization. Since I resigned from this organization some time ago, confirming my resignation by letter dated October 19, 1959, to Mr. Myron Milligan, I would appreciate you retracting this affiliation.

Ray D. Foster

Orkin Exterminating Co., Inc.
St. Petersburg, Fla.

"Anders," Not Alfred

In your February issue, I was surprised to find in the byline of my article on page 26, my first name changed to "Alfred."

Anders E. Lund

Koppers Co., Verona, Pa.

Pest Control welcomes expressions of opinions from its readers. Send ideas and comments as briefly as possible to James A. Nelson, Editor, Pest Control, 1900 Euclid Avenue, Cleveland 15, Ohio.

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It's fast, safe, economical, effective! An example in point: Fumigating bulk grain storage

FAST: Pestmaster* Methyl Bromide comes in pressurized cylinders, ready for introduction into building through the aeration system. Once the building is sealed, use of Methyl Bromide is almost pushbutton automatic.

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SPECIAL PCO SERVICES: Michigan Chemical's Field Service Personnel offer PCO educational help in sealing building, introduction of Methyl Bromide into grain, aeration, premise inspection. Grain sample analysis by independent laboratory is available when required.

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*Reg. U.S. Pat. Off.

MC

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Communicable Disease Center

PUBLIC HEALTH PESTICIDES

for mosquitoes, flies, fleas, roaches, bed bugs, ticks, chiggers, rodents

From the Communicable Disease Center, Bureau of State Services, Public Health Service, U. S. Department of Health, Education, and Welfare, Savannah, Georgia

PUBLIC HEALTH Pesticides is an annual release prepared by the Communicable Disease Center on the current status of the chemical control measures for arthropods and rodents of public health significance. The information presented is based on investigations conducted by the Technology Branch, Communicable Disease Center, supplemented by data from the literature and from unpublished material provided by other research organizations.[1] Particular emphasis is placed upon those pesticides which, under experimental or operational conditions, have provided the highest level of control and are compatible with human safety and wildlife. Such a summation precludes the consideration of all chemicals capable of exerting suppressive effects upon the pests discussed. In addition, data on experimental compounds as yet unavailable for public usage are omitted. Information on such compounds may be obtained by writing to the Technical Development Laboratories, Communicable Disease Center, Box 769, Savannah, Georgia. In this annual release, control measures which remain unchanged from those stated in 1959 may be restated verbatim.

In applying the measures described herein, full recognition must be given to the fact that many of the data discussed relate to tests conducted under the environmental conditions of a specific geographic area. Thus, the application of a particular measure under different geographical or environmental circumstances may result in control of a higher or lower level than that reported herein.

In addition, the breeding potential of the insect pest concerned will exert a marked influence on the efficacy of any chemical measure. Where no attempt is made toward the reduction of the availability of suitable breeding habitats, chemical control procedures alone may yield disappointing results. Permanent control measures, such as reduction of mosquito breeding sites (by drainage, filling, etc.) or the proper storage and disposal of garbage in a fly control program, are a prerequisite to effective abatement. Conversely it is true, that while insecticidal means are subordinate to adequate sanitational measures, maximum control usually cannot be achieved without chemical aids, either as a supplemental or an emergency phase. While this comment is true for arthropod control, the same does not apply to disease control since the latter can be, and has been, accomplished in some countries with pesticides which affect only a segment of the insect population (i.e., mosquito vectors entering habitations).

The application of chemical measures for arthropod control is not a simple procedure which can be established routinely without regard to the factors which influence the abundance of the species under consideration. The tendency exists to rely on one type of treatment or toxicant, thus making the chemical measure and the operational program one and the same. This approach is inefficient since the individual measures are merely specific tools which on an operational program are to be used at the discretion of the supervisor. From his familiarity with these tools the supervisor is in a position to select one or more measures which can best be used in a given situation. Thus, a poultry man, instead of relying on either poison baits or impregnated cords for fly control

1. Particular acknowledgment is made to the Entomology Research Division, U.S. Department of Agriculture (A); to the Florida State Board of Health, Bureau of Entomology (B); and to the California Department of Public Health, Bureau of Vector Control (C); for providing certain unpublished experimental data for inclusion in this resume. References to these organizations in the text are shown by small capital letters as indicated in parentheses above.

Table 1. Number of gallons of finished spray of varying concentrations required to produce specific dosages of toxicant in milligrams per square foot.

Percent concentration of formulation	Gallons of spray required per 1000 sq. ft. to give:			
	200 mg./sq. ft.	100 mg./sq. ft.	50 mg./sq. ft.	20 mg./sq. ft.
5.0	1.0	0.5	0.25	0.1
2.5	2.0	1.0	0.50	0.2
1.0	5.0	2.5	1.25	0.5
0.5	10.0	5.0	2.50	1.0
0.25	20.0	10.0	5.00	2.0

Table 2. Number of pounds of dusts of varying strengths required to produce specific dosages of toxicant per acre.

Percent concentration of dust	Pounds of dust required per acre to give toxicant dosage of:				
	2 lb./A	1 lb./A	0.5 lb./A	0.2 lb./A	0.1 lb./A
5.0	40	20	10	4	2
3.0	66	33	16	7	4
2.0	-	50	25	10	5
1.0	-	-	50	20	10
0.5	-	-	-	40	20

may find that the combined use of the two techniques will provide the highest level of abatement. The cords would serve as a long-term suppressive measure, the baits being used for emergency applications in the event that sanitational deficiencies caused an upsurge in fly production beyond the control capability of the cords.

In the use of chemical measures against insects, one of the primary factors is the ability of certain species to develop resistance to pesticides to which they formerly were highly susceptible. On a global basis, more than 50 species (including flies, mosquitoes, roaches, bed bugs, lice, and ticks) are reported as being physiologically resistant to one or more of the insecticides commonly employed in their control. Fortunately there are many areas where the public health pests or vector species continue to remain susceptible to chlorinated hydrocarbon pesticides despite, in some instances, the intensive use of such insecticides. The increased importance of this factor in operational programs has resulted in the use of tests to detect and measure the susceptibility levels of various species. The interpretation of data from such tests is frequently subject to individual opinions which may be highly variable, particularly in instances where the response of a suspected "resistant" population is only slightly different from that of a susceptible population. A tendency exists to call minor changes in response, resistance, and to attempt to classify the changes on a percentage basis. From a field standpoint, two questions arise in resistance determination: (a) Has a change occurred in the response of the insect to the toxicant employed? (b) Is the change of sufficient magnitude to warrant the use of a different insecticide? The techniques of detecting and measuring susceptibility levels in the insects can provide an answer to question (a) but the same methods are not suitable for solution of question (b). The latter can be answered only by observing the results of field treatments, either alone or supplemented by data on disease incidence. Unsatisfactory control may be due to resistance, inadequate application of the chemical, environmental conditions, or inferior pesticides, or any combination of these factors. Resistance data alone serve only as a diagnostic tool towards the solution of the problem; to use them otherwise is faulty.

To exert maximum reduction of arthropod populations, operators frequently resort to the use of both larval and adult measures. Unfortunately the application of these combined measures may increase the speed of development of resistance in the insect population by increasing the selection pressure placed upon it. Larvicidal treatment alone also may enhance the chance of resistance development since it exposes the population in "concentrated" density in contrast to the relatively "dispersed" state of adult densities; thus creating maximum selection pressure.

Inasmuch as the application of pesticides to breeding areas favor the development of resistance, it generally is better to rely on sanitational improvement measures against the immature stages, and reserve the insecticides for use against the adults. If larvicidal treatment is mandatory, the application of a chemical different from that employed as an adulticide is desirable (e. g., organophosphorus larvicide, chlorinated hydrocarbon adulticide). If only organophosphorus toxicants are effective against the adult stages, (e. g., salt marsh mosquitoes in various areas) a larvicide such as Paris green pellets can be used.

Throughout the major part of this release, the dosage of toxicant employed is expressed as technical material in terms of milligrams per square foot, pounds per acre, or parts per million. The dosage of the toxicant applied is dependent upon the concentration of the formulation used, together with the rate at which the material is dispersed. Thus, a 1% formulation sprayed on a surface at the rate of 1 gallon per 500 square feet provides a dosage in milligrams per square foot equivalent to the treatment of 1000 square feet with 1 gallon of a 2% formulation. Data for assisting the reader in preparing formulations are given in tables 1 and 2. The choice in selecting the concentration of a formulation is influenced by the coverage necessary, type of surface, toxicity of the pesticide, transportation requirements, and the equipment available. Methods for preparation of dusts,

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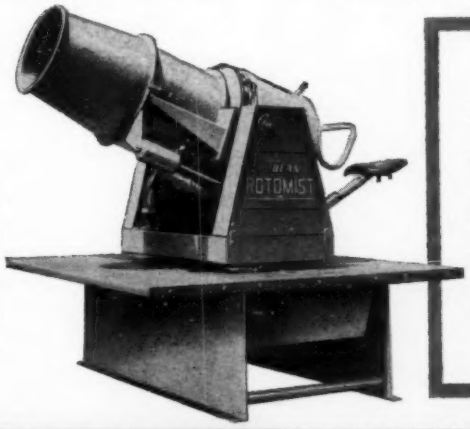
John Bean brings pest control operators a new, compact dimension in mist sprayer design with Rotomist Models 50 and 51. Exclusive, straight-through air flow design delivers more cubic feet of air for thorough, fast coverage. Fan assembly is counter-balanced for easy handling, rotates 360° laterally and moves 50° vertically for complete spray control. Smoke injector in air stream makes it easy to trace spray pattern. Either model mounts easily on a pick-up or flat bed truck for compact mobility. Top performance, operating economy, low maintenance, mobility — get them all with Rotomist — for extra profitable pest control spraying.



NEW MODEL 51

Completely self-contained with 75-gal. tank and pump capacity of 15 g.p.m. at 150 p.s.i. Also available as an air unit only in the Model 50 which uses spray material supply and pump of most any high pressure sprayer.

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- ☐ Royal Sprayer Catalog
- ☐ Facts on Mosquito Control

solutions, etc. of varying concentrations are outlined in the "Operational Memoranda on Economic Poisons" issued by the Communicable Disease Center.

Mosquito Control

The use of organophosphorus compounds in mosquito control is increasing, principally because of the resistance which many species have developed to the chlorinated hydrocarbon insecticides. Physiologic resistance to the latter pesticides has been confirmed in more than twenty species, ten of which occur in the United States. During 1959, evidence substantiated the relatively widespread occurrence of resistance to both DDT and dieldrin in *Anopheles albimanus* in Central America. In the southeastern United States, recent data have demonstrated the presence of a DDT-resistant population of *Anopheles quadrimaculatus* in one area of an impoundment on the Savannah River near Augusta, Georgia, where until the past season, DDT had been used effectively as a larvicide since 1952. The continued absence of resistance to DDT on other impoundments routinely larvicided with this toxicant for longer periods again emphasizes the variation in response of the same species in different areas. Similar evidence of locality differences in the susceptibility or resistance of a species is apparent in other mosquitoes: *Culex tarsalis, Aedes sollicitans, Aedes taeniorhynchus.* In some instances populations of *Aedes taeniorhynchus* within 5 to 6 miles of each other may show marked differences in susceptibility to DDT and dieldrin.

Despite the growing use of organophosphorus toxicants, the development of field populations resistant to malathion and parathion has been slow. Only a few instances of resistances to malathion and parathion are recorded (e. g., *Aedes nigromaculis* and *Culex tarsalis* in California where these insecticides have been used extensively during the past seven years).

Larvicides (Temporary)

Susceptible populations of culicine or anopheline larvae can be controlled by DDT (0.05 to 0.2 pound per acre) or dieldrin, chlordane, heptachlor, or lindane (0.1 pound per acre). If these dosages are ineffective in situations where fish and other wildlife are not involved (sewage lagoons, borrow pits), application rates can be doubled or quadrupled.

Where mosquito populations no longer respond to treatment with chlorinated hydrocarbon larvicides, organophosphorus compounds have been the principal chemical employed. Malathion at dosages of 0.25 to 0.5 pound per acre or parathion at 0.1 pound per acre are effective against chlorinated hydrocarbon resistant populations of *Culex tarsalis, A. nigromaculis, A. sollicitans, and A. taeniorhynchus.* Either ground or aerial equipment is used to apply these toxicants. Airplane applications of parathion should be avoided in urban areas because of the high mammalian toxicity hazard from this compound.

Paris green pellets also have been shown to be highly effective against salt marsh mosquitoes in the southeastern United States. To obtain a finished formulation containing 5% Paris green, calcium carbonate is blended with Paris green (90%) so that the resultant mix contains 20.5% of the toxicant. Twenty-five pounds of the blend is then mixed with 35 pounds of vermiculite No. 3 which had been previously sprayed with 40 pounds of an oil : emulsifier (90:10%)[2] solution. Dosage is at the rate of 15 pounds of 5% granules per acre by ground or air application. Commercially prepared pellets also are available at 5 and 10% strength.

In controlling floodwater mosquitoes in irrigated pastures and rice fields, parathion (0.01-0.1 p.p.m.); phosdrin (1.0 p.p.m.) and Bayer L 13/59 (0.5 p.p.m.) have been found effective. However, the efficacy of this method of controlling mosquito breeding in pastures is influenced to such extent by the terrain of the field and by other factors such as seepage that inconsistent results may occur. Seepage also is an important factor in rice field mosquito control. Although excellent kills of *Psorophora* larvae usually are obtained in the terraces near the injection point, infestations in outlying terraces often remain undisturbed because movement of the treated water through the soil either deactivates or removes the toxicant.

Larvicides (Residual)

Residual larvicide treatments

CDC has portable kit for measuring susceptibility levels of adult mosquitoes to insecticides.

2. Suitable oils - Standard Oil Company Nos. 341, 345; Gulf Oil Company Nos. 361, 562; Suitable emulsifier - Triton N-101 (Rohm and Haas Company).

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provide control for extended periods, thus differing from the methods previously discussed in which frequent retreatment is required. In the Savannah, Georgia, area, BHC (12% gamma isomer) at a rate of 1 pound of gamma isomer/acre, DDT (3 lbs./acre) and dieldrin (1 lb./acre) gave satisfactory control of anopheline and culicine mosquitoes for 5 to 8, 12 to 24, and 52 weeks, respectively, when emulsions were applied (2 gallons finished spray per acre) to landlocked ponds. Despite 5 applications of BHC per year no fish kill occurred over a 3-year period. *However, DDT or dieldrin treatments of this type are totally destructive to fish and should not be used where such wildlife is present.*

Residual larvicides also have given satisfactory control of various species of *Culex* and *Aedes* in Oregon, Utah, Montana, and Illinois. In log ponds in Oregon, breeding of *Culex peus, C. pipiens, C. tarsalis, and Culiseta incidens* was controlled by applications of emulsions of dieldrin, DDT, heptachlor, and malathion. The periods of effectiveness for a treatment of 3 pounds of toxicant per acre were 14, 4.5, 8.0, and 5 weeks, respectively, for dieldrin, DDT, heptachlor, and malathion. A single test at 6 pounds of toxicant per acre produced 6 weeks control with malathion or DDT and more than 10 weeks effectiveness with heptachlor. Heptachlor granules at a rate of 5 pounds of toxicant per acre reduced breeding satisfactorily for 14 weeks.

In Montana, emulsion or granular applications of dieldrin (1.0 lb. per acre) in alfalfa fields, ditches and pastures during one year were shown to curtail breeding of *Aedes vexans, A. dorsalis* and *C. tarsalis* the following year. Dieldrin granules applied at 0.5 pound of toxicant per acre as pre- or post-flood treatments in Montana and Utah study plots (0.1 to 0.5 acre) gave excellent control of culicine larvae (principally *A. dorsalis*) for an entire season. Because of the zero tolerance for dieldrin residues on many forage crops, treatment with this toxicant is applicable largely to "off-field" breeding areas. Studies have shown that both granular and emulsion formulations leave a detectable residue but those from granular preparations are at minimum levels (below 0.6 p.p.m.). Dieldrin at 1.0 pound per acre as a pre-flood emulsion treatment also has prevented *Psorophora* breeding in rice fields for an entire season where resistance is not present. DDT applied as a pre-emergence treatment at a rate of 1 to 2 pounds per acre has given promising results against *Aedes vexans* in Illinois.

Another form of residual larviciding is found in the use of dieldrin-cement pellets for control of domestic species (i.e., *Aedes aegypti* and *Culex quinquefasciatus*). Incorporation of dieldrin water-wettable powder (50%) in sand:cement (5:1) and application at a rate of one 10-gram pellet (content 16.6% dieldrin) to two gallons of water has prevented mosquito infestation for as long as 1 year. This technique appears to have value for treatment of fire barrels and similar water storage sites.

In all larvicide applications, the degree of control obtained frequently is dependent upon the type and amount of vegetative cover present. Consequently, where such cover is heavy, it may be necessary to increase the dosage or the amount dispersed in order to obtain satisfactory results. Under this condition, granular formulations usually provide better control than do emulsions or oil sprays.

Adulticides

In the United States, the insecticide of choice for residual application to houses is DDT applied at a rate of 200 mg. of toxicant per square foot (approximately 1 gallon of 5% spray per 1000 square feet). Because of the isolated instances of DDT-resistance in populations of *A. quadrimaculatus* in Georgia and Maryland, together with the almost complete absence of malaria in this country, the use of other toxicants for interior house application is not warranted. However, in areas outside the United States, DDT, dieldrin, and BHC are utilized; the first two being the insecticides of greatest usage for that purpose. Since the susceptibility of the vector, house construction, and environment may play a significant part in governing the residual life of a treatment, the dosages employed and the periods of effectiveness in different countries frequently vary. Dosages of 100 or 200 mg. of DDT per square foot, 50 mg. of dieldrin, and 50 mg. of BHC are the rates most commonly employed. In comparative studies of the length of residual action of DDT and dieldrin on plywood surfaces in animal-baited huts using *A. quadrimaculatus*, the mortalities through 36 weeks at 200 mg. of DDT per square foot were only slightly higher than those obtained at 100 mg. of DDT per square foot. Dieldrin at 25 mg. per square foot was less effective than at 50 or 60 mg. per square foot through week 32. The two higher dosages of dieldrin were equally effective both giving mortalities similar to that obtained with DDT at 200 mg. per square foot. A suspension is the formulation of choice both from the transportation and handling aspects as well as from the standpoint of effectiveness. The latter applies chiefly to DDT residues which are most effective against mosquitoes when derived from suspensions.

The increase in anopheline populations resistant to both DDT and dieldrin during the past two years has stimulated interest in the feasibility of using organophosphorus compounds as residual insecticides. Laboratory and simulated field tests have shown that of the commercial compounds available in the United States, malathion is the most promising. The extended residual action of this toxicant was confirmed in field studies in occupied houses in Mississippi where suspension treatments of 100 mg. of malathion per square foot produced 100 percent kills of dieldrin-resistant *A. quadrimaculatus* for the entire 4-month observation period. In recent collaborative studies[3] in El Salvador, malathion suspen-

3. Communicable Disease Center, Pan American Sanitary Bureau, El Salvador Ministry of Health, and International Cooperation Administration.

sions have been evaluated in dwellings at application rates of 50, 100, and 200 mg. per square foot. Based on wall cage tests with 30- and 60-minute exposure periods, the applications at 100 and 200 mg. of toxicant per square foot gave satisfactory mortalities of dieldrin- DDT - resistant *A. albimanus* on all surfaces (wood, thatch, mud, cement) for 2½ to 3 months.[4] The dosage of 50 mg. of toxicant per square foot was ineffective within 4 weeks after treatment. Consistent high mortalities were obtained on wood surfaces. There were no reports or complaints of ill effects in the exposed population or among the spray personnel.

Outdoor residual applications are of value as barrier strip treatments around individual premises to give relief from daytime annoyance by certain culicine species. In the Savannah, Georgia, area, DDT applied as a 1.25% emulsion at rates of 5 to 10 pounds of toxicant per acre to the outside of houses and to shrubbery, grass, and other vegetation within a radius of approximately 100 feet of the dwelling caused significant reduction in daytime annoyance from salt marsh mosquitoes for periods of 1 to 9 weeks. The variation in the duration of effectiveness of the DDT treatments was attributed to mosquito potential, more frequent treatments being required when excessive mosquito production occurred. Other pesticides - BHC (1.3 pounds gamma isomer per acre), dieldrin (4 pounds per acre), lindane (0.5 pound per acre), and Diazinon or malathion (2 pounds per acre), — were ineffective. In Montana similar application of 5% DDT emulsion on farm premises resulted in a 75 to 98% reduction of daytime biting rates of *A. vexans*, *A. nigromaculis* and *A. dorsalis* for at least 20 days. Because new populations of mosquitoes usually invade an area at dusk, these barrier strip treatments have little effect on nighttime biting rates.

Outdoor space treatments with

4. Similar results were obtained with Baytex (Bayer 29493, S 1752), a compound commercially available outside of the United States.

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mist or fog machines are utilized chiefly against culicine species. Susceptible populations of *Culex*, *Aedes*, and *Psorophora* can be reduced effectively by applications of fuel oil solutions of DDT (5%), chlordane (2.5%) or lindane (2%). The dosage rates of outdoor space treatments on an acre basis depend upon several factors including topography, vegetative cover, wind conditions, swath width, etc. In general, treatments which give 0.3 - 0.5 pound of DDT or 0.1 - 0.2 pound of chlordane or lindane per acre provide satisfactory reduction of mosquito densities. However, because of the variables present, it is desirable that a supervisor evaluate the performance qualities of his equipment with the formulations employed and from these data establish operating procedures under different weather conditions and terrain. Moreover, the reduction of mosquito densities by space applications is temporary and where the mosquito populations are high, daily treatments may be necessary.

The extent of resistance to chlorinated hydrocarbons in many pest species has led to increasing use of organophosphorus compounds in space treatments. Because of its efficacy against adult mosquitoes and its relatively low mammalian toxicity, malathion is the principal compound used for this purpose. In Florida, extensive tests have shown that malathion (6% in fuel oil) fog dispersed at a rate of 8 gallons per linear mile gave kills of 92 and 87% respectively of caged salt marsh mosquitoes at distances of 330 and 660 feet.[5] Recent tests (B) of mist sprays of malathion emulsion (6.0%), dispensed at a rate of 25 gallons per mile, produced average mortalities of caged DDT - resistant *A. taeniorhynchus* of 89% at distances of 165′ and 330′. Three runs of 5% malathion dust discharged at 40 pounds per mile gave 99% kill at the same distances. DDT (6%) mist and BHC dust (3%, discharged at 80 lbs./mile) were ineffective.

At Savannah, Georgia, malathion fog, dust, and spray treatments[6] made on the same nights in the dosage range of 0.1-0.3 pound of toxicant per acre[7] showed that each type of application gave somewhat erratic results in different runs, thus reflecting the variability in the environmental conditions prevailing at the time of the individual test. Three fog treatments at 0.1 pound per acre produced caged adult female mortalities of 98, 53, 39, and 0% at distances of 135′/270′/540′/and 810′[8]. Average mortalities for dust (0.3 pound per acre) and spray (0.2 pound per acre) treatments at the same four distances were 63/81/3/2 and 95/55/32/ and 27%, respectively. Although these results reflect a lesser effectiveness of the dust application, the data at distances of 135 and 270 feet at "wooded" sites alone show mortalities of 97/39, 93/94, and 90/37 respectively for the fog, dust and spray treatment. However, the lower dosage employed in the fog application as compared to the other treatments indicates it to be the most effective of the dispersal methods studied. In parallel tests of malathion fogs and dusts at approximately 0.1 pound of toxicant per acre, comparable mortalities were obtained at 135′ and 810′ but the fog treatments gave superior kills at the "open" stations at 270′ and 540′. Comparative tests of malathion dusts (4%) and sprays produced similar average percent mortalities for both types of treatment. In general, the over-all effectiveness of fogs appears to be slightly above that for sprays and dusts. This fact, together with the operational advantages of the method and its ready public acceptance, favors it as the technique of choice for routine adulticiding.

In a series of 9 tests at dosages of 0.07 to 0.09 pound per acre, malathion fog treatments gave average kills of 93, 90, 57, and 17 in "open" sites at 135′/270′/540′/and 810′. At the "wooded" sites average mortalities of 57, 22, 6, and 11% were obtained at the same distances. These data again emphasize the variability in effectiveness that can be easily induced by barriers in the path of the fog.

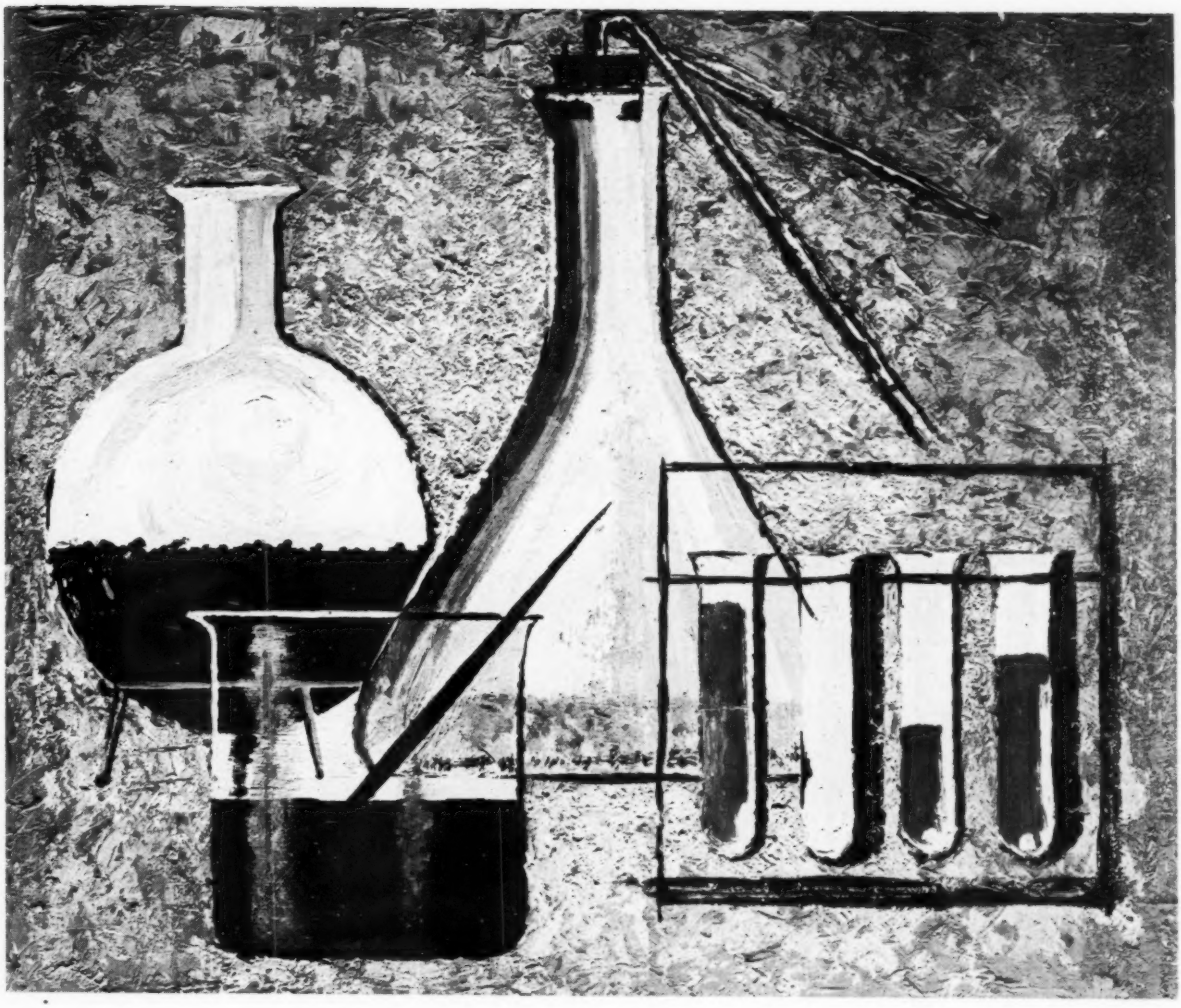
Experimental tests of Dibrom and malathion fuel oil solutions and Sevin-fuel oil suspensions as aerial sprays against salt marsh mosquitoes (3 quarts of formulation per acre) indicate Sevin to be ineffective at rates of 0.25 and 0.5 pound per acre. Malathion and Dibrom gave excellent kills at 0.05 and 0.1 pound per acre, but results were poor at an application rate of 0.025 pound per acre. Aerial application of thermal aerosols, produced from fuel oil formulations containing 5, 10, or 15% malathion, an equivalent percentage of heavy aromatic naphtha, and 15% fog oil, produced satisfactory kills of *Aedes taeniorhynchus* in Florida (A).

Tests of malathion versus Diazinon, ronnel and DDVP space applications indicate malathion to be equivalent to or superior to these toxicants. Diazinon and malathion dust treatments at a dosage of 0.1 pound per acre gave average mortalities at distances of 135′/270′ of 51/42 and 78/53% respectively. In Montana, the dispersal of 3% gamma BHC dust at 30 to 35 pounds per linear mile has been shown to reduce effectively nighttime densities of susceptible *A. vexans*, *A. dorsalis* and *A. nigromaculis* in an urban area on the evening of treatment. In Illinois, limited tests with vermiculite granules impregnated with an aromatic solvent (25%) and applied at a rate of 10 pounds per acre to woodland areas indicated that densities of *Aedes trivittatus* and *Aedes vexans* were reduced to minimum levels for periods up to 4 days. This effectiveness was equivalent to that produced by similar applications of vermiculite granules containing 10% DDT.

Fly Control

With the widespread occurrence of resistance to chlorinated hydrocarbon insecticides in populations of *Musca domestica*, the

5. A malathion: lethane (3:3%) formulation has given comparable results to malathion alone (6%).
6. Fog and spray formulations were 6.5 percent in fuel oil; the dust was 12.5 percent.
7. All dosages per acre calculated on a 300′ swath width.
8. Average of cages in "open" and in "wooded" areas.



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pesticides of current choice for house fly control are organophosphorus compounds. Physiologic resistance to organophosphorus toxicants has appeared in house fly populations in various areas. While the problem is not as general as with the chlorinated hydrocarbon insecticides, resistance to malathion has become more extensive in the last two years. Nonetheless, resistant populations may be spotty in distribution, e. g. in the Savannah, Georgia, area malathion - resistant populations occur at certain dairies whereas in other dairies the populations remain susceptible.

Resistance of a behavioristic as well as a physiologic type also occurs in *M. domestica* populations, particularly in regard to poison baits. Populations, after readily accepting malathion poison baits for weeks, may develop a "bait shyness" whereby the flies no longer feed on the bait. However, baits with other toxicants are accepted by such flies and the rejected malathion baits can be used effectively at other dairies. One of the interesting aspects of the behavioristic resistance has been its failure to persist from one season to the next, effective control being achieved at a dairy with malathion baits after the same type baits had failed the previous season.

Experience has shown that even with the most effective chemical technique, a neglect of sanitation resulting in maximum fly production makes it difficult, if not impossible, to attain satisfactory fly control. Consequently, any fly control effort must include sanitation as a basic measure if successful abatement is to result.

Because of the general usage of organophosphorus compounds in fly control, those toxicants most commonly employed for this purpose together with use data have been summarized in Table 3.

Table 3. Organophosphorus Insecticides Used In Fly Control

Type Application	Toxicant	Formulation	Remarks
		(For 50 gallons of finished spray)	
RESIDUAL	Diazinon	2 gal. 25% EC or 16# 25% WP plus water	Add sugar (25#) to formulation for maximum residual effectiveness. Spray surfaces at a rate of 2 or more gallons per 1000 square feet. Maximum strength permitted for Diazinon and ronnel 1.0%, malathion, 5.0%.
	Malathion	2-4.5 gal. 55% EC or 32-64# 25% WP plus water	Diazinon and ronnel are accepted for use in dairy barns including milk rooms, meat packing, and other food processing plants. Malathion is restricted to use in the dairy barn only. None are accepted for complete interior treatment of houses.
	Ronnel (Korlan)	2 gal. 25% EC or 16# 25% WP plus water	AVOID CONTAMINATION OF HUMAN AND ANIMAL FOOD, WATERING TROUGHS.
BAITS (Dry/Wet)	Diazinon	1# 25% WP plus 24# sugar; 2 fl. oz. 25% EC plus 3# sugar in 3 gal. of water.	Apply 3-4 oz. (dry) or 1-3 gallons (wet) per 1000 square feet in areas of high fly concentration. Repeat 1 to 6 times per week as required. Avoid application of bait to dirt or litter.
	Malathion	2# 25% WP plus 23# sugar	The use of permanent bait stations will prolong the efficacy of each treatment.
	Ronnel (Korlan)	2 pts. 25% EC plus 3# sugar in 3 gal. water.	All toxicants are available as commercial baits which are labeled for use in dairies and, except for DDVP, in food processing plants. None of these baits should be employed inside homes.
	DDVP	3-6 fl. oz. 10% EC plus 3# sugar in 3 gal. water.	DO NOT CONTAMINATE FEED OR WATERING TROUGHS.
	Bayer L 13/59	1# 50% SP plus 4# sugar in 4 gal. water.	
IMPREGNATED CORDS	Parathion and Diazinon	To be prepared by experienced formulators only.	Install at rate of 30 linear feet of cord per 100 square feet of floor area. Accepted for use in dairies and food processing plants. Handle and install cords per manufacturer's instructions.
LARVICIDES	Diazinon	1 fl. oz. 25% EC to 1 gal. of water	Apply 7-14 gallons per 1000 square feet as a coarse spray. Repeat as necessary, usually every 10 days or less. For chicken droppings use only where birds are caged.
	Malathion	5 fl. oz. 55% EC to 3 gal. of water	
	Ronnel (Korlan)	1 pt. 25% EC to 3 gal. of water	
	DDVP	2 fl. oz. of 10% EC to 1 gal. of water	AVOID CONTAMINATION OF FEED OR WATER OR THE SPRAY ON ANIMALS.

EC - Emulsifiable Concentrate WP - Wettable Powder SP - Soluble Powder

Residual Treatments

Against flies susceptible to the chlorinated hydrocarbon insecticides (e.g. blow flies) 5% DDT is still the insecticide of choice; emulsions or suspensions applied to the point of run-off will provide effective residues. Other related insecticides such as dieldrin (0.625 or 1.25% emulsion), chlordane (2.5 to 5% emulsion) or lindane (0.5 to 1.0%) also have provided effective fly control when applied to the point of run-off on exterior surfaces of houses (including porches) and animal shelters. Applications of these latter insecticides within homes in the United States should be limited to treatments of selected surfaces such as doors, window sills, and screens. DDT, dieldrin, and chlordane are not approved

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for use in dairy barns, but lindane (25 mg./sq. ft.) or methoxychlor at 200 mg./sq. ft. are acceptable for that purpose.

Three organophosphorus toxicants—Diazinon, malathion, and ronnel—are currently labelled for use against house flies in dairy barns. The addition of a sugar additive to formulations of these toxicants generally augments the efficacy of the residues, but the degree of increase in effectiveness varies with the specific insecticide involved. With the concentration used, sugar is usually included in the formulation at a rate of 2.5 parts to 1 part of the toxicant.

The period of effectiveness of residual treatments with organophosphorus compounds shows considerable variation. In the Savannah, Georgia, area, malathion:sugar formulations (200:500 mg./sq. ft.) gave good control up to 7 weeks while Diazinon:sugar applications (100:250 mg./sq. ft.) yielded similar or higher levels of effectiveness. However, the results, particularly with malathion, were erratic, three dairies showing satisfactory control for 6 to 7 weeks, one for 3 weeks and the fifth for 1 week. In other areas, experimental data for these two compounds reflect control for longer or shorter periods than indicated above, presumably an effect of differences in the fly potential or climatic factors involved.

Ronnel has given excellent control of house flies for periods of 8 to 9 weeks in the Savannah, Georgia, area, when applied at a rate of 200 mg./sq. ft. to the interior surfaces of dairies. At 100 mg./sq. ft. with or without a sugar additive, the period of effectiveness was 4 to 5 weeks. At 20 mg./sq. ft. with or without sugar, control was ineffective within 1 week after treatment. The toxicologic hazard of this compound is similar to that of malathion.

Residual treatments are effective against other flies that have resting habits similar to those of the house fly. The lesser house fly *Fannia canicularis*, which frequently is a pest in chicken ranches and dairies, is readily susceptible to residual applications of dieldrin, ronnel and malathion. Dieldrin at a dosage of 25 mg./sq. ft. remains effective for extended periods whereas the toxicity of malathion and ronnel deposits is relatively short lived. However, the latter compounds will control both *Fannia* and resistant *M. domestica*.

In making applications on interior surfaces of chicken ranches, extreme care should be taken to avoid feed and water contamination. Since both *Fannia* and *M. domestica* frequently rest out-of-doors on vegetation and exterior walls, treatment should be applied to these surfaces as well as to the interior of the building.

Impregnated Cords

The installation of parathion- or Diazinon-impregnated cotton cords in animal shelters has provided season-long control of *M. domestica* in the Savannah, Georgia, area. In other parts of North America, the duration of effective house fly control has been less but, except for relatively unsatisfactory results reported from Arizona, extended periods of abatements have resulted from cord installation. On California chicken ranches, tests with parathion-Diazinon cords indicated 6 to 7 weeks of satisfactory control of house fly and *Fannia canicularis* populations. In British Columbia, parathion and Diazinon cords installed at a piggery maintained control of house flies for an entire season. Satisfactory control of *F. canicularis* in dairy barns also has been reported in Utah.

The installation rate for treated cords is 30 linear feet per 100 square feet of floor area. Data indicate that the cord, 3/16″ in diameter, is essential for season-long control with Diazinon, the smaller cord (3/32″ diameter) yielding only 7 weeks abatement in dairy barns.

Studies of ronnel-impregnated cords in dairies in Savannah, Georgia, indicate that this toxicant is an effective cord impregnant. In 9 of the 10 dairies treated, satisfactory control was achieved for periods of 9 to 16 weeks. These results are of considerable interest since ronnel is the first toxicant of relatively low mammalian toxicity to be of value in the preparation of treated cords. The cord (3/32″ diameter) was dipped in a 25-percent ronnel-xylene solution and installed at the standard footage rate.

Field studies in Georgia and Florida utilizing dimetilan bands showed reduced but unsatisfactory fly control when the bands were installed at the rate of 6 linear feet of bands per 100 square feet of floor area. In a single test where installation was at the rate of 30 linear feet per 100 square feet of floor area, satisfactory to excellent control was obtained for the entire season.

Except for ronnel, the toxicity hazards of effective impregnants necessitate that the general public utilize only commercially prepared products which have been approved for use in dairy barns, chicken ranches and food processing establishments[9]. As ronnel-impregnated cords are not yet available and the toxic hazard of the pesticide is considerably below that of parathion and Diazinon, it may be feasible for individual operators to impregnate their own cords. However, for maximum safety it is desirable that the impregnation be made by commercial formulators who are familiar with the precautions that are necessary in handling insecticidal concentrates.

Poison Baits

Pesticides commonly employed in baits and accepted for use in dairy barns are malathion, ronnel, Bayer L 13/59, Diazinon, and DDVP, the latter alone or combined with malathion or Diazinon.

The principal value of poison baits lies in their relatively low cost per treatment and in their immediate suppressive effect upon fly densities. Bait treatments generally produce spectacular reduction of fly densities within a few hours, although such effectiveness is of short duration unless further treatments are made. Thus, the success of bait applications in controlling fly populations is de-

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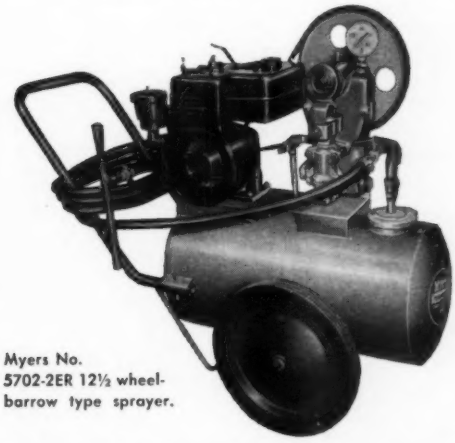

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pendent on the diligence of the operator.

Permanent bait stations are of value in minimizing the effort and time required for dispensing baits. At the same time this practice provides for continual reduction of the fly population. The use of plywood trays (1 to 2 trays per 1000 square feet of floor area, each charged weekly with 4 oz. of bait) will provide adequate house fly control for extended periods.

With liquid baits, a chicken-watering device equipped with a screen wire barrier over the trough to prevent clogging by dead flies can serve effectively as a permanent bait station. In field tests the placement of 17 and 11 such dispensers at a chicken ranch and a dairy barn, respectively, has resulted in satisfactory fly control for 5- and 6-week periods. Replenishment of the baits usually was required at 3 to 4 weeks or at longer intervals. A 12.5% sugar-water solution of Bayer L 13/59 (1.0%) or of DDVP (0.1%) was employed.

Where house flies display a behavioristic resistance to malathion baits, formulations containing other toxicants have been accepted readily by these flies. In addition, laboratory tests showed that pyrethrin or allethrin, combined with piperonyl butoxide at a ratio of 1:10, was about equally effective at concentrations of 0.01 to 1.0% toxicant against malathion-resistant and susceptible strains of flies. Field tests of similar baits against house flies in dairies showed the pyrethrin formulations to give satisfactory kills which were superior to those achieved with the allethrin formulations.

Recent field tests in Florida ([A]) show dimetilan at 1.0% and Dibrom at 0.25% to have promise as bait toxicants.

Outdoor Space Sprays

Space treatments are utilized chiefly in situations where residual and larvicidal applications fail to give satisfactory fly control. As with mosquitoes, this type of treatment produces only a temporary effect on the adult populations, consequently at a site of heavy fly production, such as a vegetable cull dump, repeated applications on a daily basis are usually required. Since the adult kill depends on contact with the insecticidal droplets, treatment must relate to the activity pattern of the flies. In addition, as the quantity of toxicant required per specimen is greater for flies than for mosquitoes, mist or dust applications usually are more suitable than fog treatments.

Flies which are susceptible to the chlorinated hydrocarbon insecticides can be killed with emulsions or fuel oil solutions of DDT (5.0%), chlordane (2.5%) or lindane (2%). If odor is not a factor, a 5% technical BHC emulsion (12% gamma isomer) is cheaper than lindane and equally effective. Against DDT-resistant flies, chlordane and lindane are effective. The addition of DMC to DDT formulations also will control DDT-resistant flies. Under field conditions a formulation of DDT:DMC at a ratio of 7.5:1 gave excellent reduction of house flies resistant to several chlorinated hydrocarbons.

Organophosphorus compounds as space sprays or dusts are generally effective against *M. domestica* resistant to the chlorinated hydrocarbon insecticides, but the dosages required for satisfactory kill are relatively high. In recent experimental studies using adult house flies confined in screen cages at distances of 50, 100, 150, and 200 feet from the discharge, water emulsion sprays were shown to be more effective than dusts at comparable dosages. Malathion dusts (85-110 lbs., 12.5% conc. per mile) applied at a dosage of 0.5 pound per acre (based on 200′ swath width, 3 replicates) gave only an average 58% mortality of flies 50 feet from the point of discharge as compared with 99% mortality obtained under the same conditions with the water emulsion mist spray (9.5-10.5 gals., 12.5% conc. per mile). Diazinon sprays at a dosage of 0.3 pound per acre or higher gave essentially 100% kills at 200′ from the point of discharge. At a dosage of 0.2 pound per acre (32 gals., 1.5-2.0% conc. per mile) water emulsions of Diazinon or DDVP were equally effective giving 90 to 100% kills up to 100′ with decreasing mortalities at greater distances. Malathion at the same dosage and application rate gave average mortalities of 58 and 26% at 50 feet and 100 feet. Dosages of 0.4-0.5 pound of malathion per acre were required before satisfactory kills at the 100 foot point could be obtained.

Quick knockdown sprays, either hand or mechanically dispersed, are now being used to a greater extent by dairy and beef cattle farmers. Recent tests ([A]) of deodorized kerosene solutions of Diazinon (0.1%), ronnel (2.0%), malathion (2.0%) or synergized pyrethrin or allethrin (0.1%) applied with an electric mist sprayer against house flies in dairy barns indicated that all formulations produced 70 to 98% reduction within 10 minutes after treatment. However, most of the applications failed to produce more than 0 to 50% reduction 24 hours after treatment even when repeated daily for 5 days to 3 weeks.

Larvicides

Larvicides are of value in fly control for the treatment of garbage or of animal excrement as it accumulates at stockyards, chicken farms, or other problem sites. Since the use of larvicides may cause or augment the rapid development of resistance in the fly population, sanitational practices should be regarded as the first line of defense, larvicidal applications being utilized only as an emergency or supplemental measure.

In using chemical measures against fly larvae, the principal difficulty lies in applying the toxicant in such a manner that adequate contact between it and the insects can be obtained. Although flies breed chiefly in the upper layers of a substrate, adequate penetration of media such as excrement, garbage, tomato pulp, etc., is difficult to achieve. Thus, in treating the breeding material, it may be advisable to employ a greater volume of a dilute formulation than *vice versa*.

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Against susceptible fly larvae, chlordane (100 to 200 mg./sq. ft.), BHC (200 mg./sq. ft.), dieldrin or aldrin (25 to 50 mg./sq. ft.) have provided satisfactory control. Against house flies, chief reliance has been on organophosphorus compounds (Table 3) of which Diazinon appears to be the most effective, both from the standpoint of initial kill and residual effectiveness. Thiourea (500-1000 mg./sq. ft.) also is effective against fly larvae but inferior in control performance to Diazinon. Field tests ([A]) with a calcium arsenate suspension (4-6% concentration) applied at a rate of 600 to 1000 milligrams per square foot gave satisfactory kills for periods up to 4 days.

Although human excrement in privies is a poor producer of *M. domestica*, studies indicate that dieldrin, chlordane, aldrin, or BHC applications to the excreta in general premises spraying can cause an enormous increase in house fly propagation. The basic factor behind this increase is that the insecticide treatment destroys the natural infestations of the soldier fly *(Hermetia illucens)* thus causing the media to become semisolid in nature and suitable for the breeding of *M. domestica*. The latter, as a result of being resistant, is unaffected by the chemical treatments. Thus, the adverse effect of pesticide applications on house fly production from privies, as well as the limited breeding of *M. domestica* in untreated structures, indicates that treatment of privies should be avoided. In field trials the adverse effect of *H. illucens* on house fly breeding in poultry dropping has been demonstrated by the artificial infestation of the droppings with these larvae.

As a larvicide for use by the individual householder, paradichlorbenzene applied at a rate of 2 ounces per garbage can has been shown to give satisfactory control of fly breeding therein for 1- to 2-week periods.

For the control of blow fly breeding in animal carcasses, several pesticides are effective. One pint of 0.25% aldrin, endrin, or Diazinon emulsion applied to dog

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carcasses protected them from blow fly infestation for 26 to 30 days. Chlordane (0.5%), BHC (1.0% (15% gamma)), and malathion (0.25%) were less effective. In carcasses heavily infested with larvae, 0.25% emulsions of endrin, Diazinon, and malathion, and 0.5% emulsions of dieldrin and aldrin gave complete kill of full grown maggots, while concentrations of 2.0% BHC were required for effective reduction of the infestations.

Flea Control

Although increasing numbers of species of insects are exhibiting lowered susceptibility levels to one or several insecticides, the Oriental rat flea, *Xenopsylla cheopis*, is still susceptible to DDT and may be easily controlled by application of a 5 to 10% dust to rat runs and harborage areas.

Particularly in the southeastern area of the United States, increasing reports have been received concerning the difficulty in controlling yard and animal infestations of the dog and cat fleas, *Ctenocephalides canis* and *C. felis*, despite repeated applications of several of the chlorinated hydrocarbon insecticides, including DDT and chlordane. Although resistance of these species of fleas to insecticides has not been demonstrated in the laboratory with existing techniques, this "resistance" is definitely a contributory factor to the control efficiency achieved although in some cases the poor results have been due to improper or inadequate application and coverage. To achieve control, a thorough and complete coverage of all areas on the premises where fleas may be harboring or developing, including the animal and its quarters, must be obtained.

Premises treatment ([A]) with 1.0% emulsions of chlordane, Diazinon, malathion, lindane, and Bayer L 13/59 applied to the infested yards at the rate of 1 gallon of formulation per 1000 square feet indicated that Diazinon was the most effective, giving 100% reduction for the 63-day observation period. Lindane approached Diazinon in effectiveness while malathion and Bayer L 13/59 yielded satisfactory mortalities for 7 and 35 days, respectively. Chlordane was ineffective at 1.0% but application of a 5.0% emulsion gave 84% or greater reduction for 63 days. A single test using 0.5% Diazinon yielded results similar to those achieved with the 1.0% formulation.

Flea control on dogs and cats is usually accomplished satisfactorily by utilizing malathion as a 3 to 5% dust or 0.5% spray. Malathion has been used at these concentrations on dogs and cats without any harmful effects. In addition, rotenone or pyrethrum dusts at 1% concentrations and synergized pyrethrum (0.2%) may be used on both dogs and cats. One percent lindane or 2 to 4% chlordane dust is restricted for use on dogs only.

Roach Control

The continued spread of resistance to chlordane in populations of the German roach, *Blattella germanica*, has led to increased use of organophosphorus insecticides in roach control. However, none of these toxicants apparently provides the persistent level of control formerly characteristic of chlordane residues. Although strains of German roaches resistant to malathion have been developed under laboratory selection, resistance to organophosphorus compounds in field strains as yet has not been conclusively demonstrated. Compounds in current use include malathion, ronnel, Diazinon, or dicapthon (Table 4).

Table 4. Insecticides Commonly Employed in Roach Control

Insecticide	Formulation	Percent Concentration
Chlordane	Spray	3.0
Dieldrin	Spray	0.5
	Dust	1.0
Diazinon	Spray	0.5a/
	Dust	5.0b/
Dicapthon	Spray	1.0b/
Malathion	Spray or dust	1 - 5
Ronnel	Spray	2.0

a/ At 1.0% for pest control operators only.
b/ Pest control operators only.

Household tests ([A]) in comparable dwellings with dusts of Diazinon (1%), and dicapthon, ronnel, or malathion (4%) in pyrophyllite indicated Diazinon to be the most effective, giving 87 to 94% control of German roaches during the 60-day observation period, with 77% control for an additional 30 days. Oil and water-based sprays evaluated over the same time intervals have given 98 to 100% control, indicating these formulations to be more effective than the dusts. Roaches were observed to avoid dust deposits and seek areas where a dust could not be applied or would not adhere. Dusts, however, drifted well and could be utilized effectively in areas difficult to spray, such as the interiors of hollow walls, etc.

Laboratory tests with Sevin have shown that emulsions alone or synergized with piperonyl butoxide were relatively ineffective against resistant German roaches. However, a 5% suspension of Sevin gave 95 to 100% control for the 60 - day observation period.

With organophosphorus toxicants, residual activity has been shown to vary with the surface treated (e. g. Diazinon remains effective longer on materials such as wood or wallboard than on linoleum or glass). Also the control efficiency achieved with many of the organophosphorus compounds appears to be directly related to the completeness of coverage achieved. In addition, staining problems may arise from treating certain types of surfaces such as wall paper, plaster, etc. Dicapthon should be used with caution, particularly on alkaline surfaces. Also, caution should be used when spraying oil-base solutions around asphalt or vinyl tile floors. Spillage on surfaces of this type causes a softening and surface marring effect.

Studies ([A]) with 3 silica gel formulations indicated that 2 formulations provided 72 to 95% control of German roaches for periods of 2 to 3 weeks. The third was ineffective. None of the formulations were as effective as Diazinon dusts , but two were superior to malathion. Special care

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must be exercised in applying the silica gels, otherwise the particles diffuse throughout the home.

Against susceptible *Blattella germanica* and for the control of other species of roaches, chlordane up to 3% as an emulsion or solution and dieldrin as a 0.5% solution or 1.0% dust are the insecticides of choice.

Application of any of these pesticides in households or in food handling establishments should be as a spot treatment, utilizing a coarse spray or a dust to treat baseboards, along water pipes, and other roach harborage areas and runways.

To obtain a quick kill in heavy roach infestations or to drive the insects from protected recesses, the use of aerosol formulations of pyrethrum alone or in combination with a residual treatment is of value. Where a combination application is made, the irritation of the roaches caused by pyrethrum activates them to the extent that a greater amount of the residual deposit is "picked up" by the insect.

Bed Bug Control

Although resistant populations of bed bugs, *Cimex lectularius* and *C. hemipterus*, to DDT have occurred in eight countries outside of the United States, only few instances of such resistance (in *C. lectularius*) have been reported in this country. Consequently, DDT still continues to be the insecticide of choice for control of bed bugs in homes. A single application of 5% DDT emulsion or solution to the baseboards, wall crevices, bedsteads, and mattresses of infested rooms usually gives excellent control of these insects.

Where DDT-resistant bed bugs are encountered, lindane (0.1%), ronnel (1.0%), or malathion (0.5-1.0%) can be utilized. With either insecticide, the treatment of mattresses and upholstery must be done with care so that only a light application of the toxicant is obtained. Under no circumstances should these materials be soaked with spray. As an added precaution, the bedding used by infants should not be treated. Retreatment of mattresses and furniture should not be made at less than 2-week intervals. For treatment of baseboards and other hiding places (except bed or mattresses) the concentration of lindane should be increased to 0.5%.

Synergized pyrethrin sprays (0.2% pyrethrin) also are effective against DDT-resistant bed bugs, but two or more treatments at intervals of 2 to 6 weeks may be required.

Tick and Chigger Control

Ticks, principally the brown dog tick *Rhipicephalus sanguineus*, occasionally invade dwellings and cause severe annoyance to the occupants. Formulations containing 3% chlordane, 5% DDT, 0.5% dieldrin, 0.5% lindane, or 0.5% Diazinon are effective against this species. These pesticides should be employed as *spot treatments* to baseboards, floor and wall cracks, and other harborage sites within the house as well as to the sleeping area of the dog. In areas where the control of this tick by DDT and chlordane sprays has not been satisfactory, lindane applications have given good results. Diazinon, as a 0.5% emulsion (A) in household application, has given 97 to 100% control for 12 weeks. Malathion (1%) in deodorized kerosene produced 94 to 100% control during the same period. A 1% malathion emulsion was generally ineffective when applied to alkaline surfaces such as concrete blocks. To prevent reinfestation in the homes, dogs should be treated regularly. Neither Diazinon nor dieldrin formulations should be used on animals, dusts containing lindane (1%), chlordane (2-3%), or DDT (5%) being suitable for that purpose.

Area control of ticks can be obtained with the application of any one of several chlorinated hydrocarbon insecticides. DDT, chlordane, dieldrin, and toxaphene at rates of 1.0 to 2.0 pounds of toxicant per acre, or BHC at a rate of 0.5 pound of the gamma isomer per acre, give effective abatement of ticks under field conditions. Sprays (suspensions or emulsions) or dust formulations of these pesticides produce similar results. The level of con-

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trol secured is dependent on the adequacy of the coverage. In brush areas 50 gallons of spray or 40 pounds of dust per acre are required as compared to approximately half those amounts in sites of thin cover such as lawns, etc. Treatments with these chemicals usually prevent reinfestation for 30 days or more.

For controlling area infestations of chiggers, *Eutrombicula alfreddugesi*, the locality should be treated with toxaphene or chlordane at 1 to 2 pounds per acre, lindane at 0.25 or 0.5 pound per acre, or dieldrin at 0.6 to 1.0 pound per acre. Either spray or dust formulations can be employed, special care being taken to insure thorough coverage of the area. Application rates of 40 pounds of dust or 50 gallons of spray per acre may be required.

Small plot studies with heptachlor emulsions ([A]), at dosages of 0.5 to 3 pounds of toxicant per acre, have given varied degrees of control. The application at 3 pounds per acre gave 90% control or better, except for 2 weeks, over a 16-week period. The dosage of 2 pounds per acre was less effective during this period, while 0.5 and 1.0 pound per acre applications were considered unsatisfactory after 4 weeks.

In treating woodland areas for tick or chigger control, avoid application to ponds, streams, and to other water courses or to their adjacent margins since these pesticides are highly toxic to fish.

Rodent Control

The importance of sanitation, including proper garbage disposal, food storage, harborage elimination, and rat proofing, must be emphasized. Sanitation is essential to the permanent control of commensal rats and mice, and the use of rodenticides should be regarded as supplementary to sanitation.

The situation with regard to rodent control is quite encouraging, since rats, unlike insects, do not appear to have developed resistance to the available poisons. The slow-acting rodenticides, including warfarin, Pival, Fumarin, and Diphacinone are preferred for use in most situations because of their effectiveness and low degree of toxic hazards to humans and useful animals. Of this group, warfarin has had the widest use in this country.

Anticoagulants

It has been shown that the susceptibility to anticoagulants of the various species of commensal rodents differs. Accordingly, in the interest of economy and safety, the lowest bait concentration consistent with the most effective control should be used.

Dependable control of the roof rat, *Rattus rattus*, requires the use of a concentration of 250 p.p.m. of anticoagulant in the finished bait which contains 0.025% anticoagulant. However, field tests have shown that warfarin used at a concentration of 50 p.p.m. is effective for control of the Norway rat *(R. norvegicus)*. Mice react in the same general way as Norway rats, although they show more individual variation. There is evidence that under certain conditions Norway rats may be controlled a little more rapidly, though no more surely, by using 100 p.p.m. of warfarin in bait instead of 50 p.p.m. However, where the species of rat concerned is not definitely known or where roof rats are involved, the 250 p.p.m. concentration should be used. Commercial concentrates generally contain 0.5% anticoagulant in corn starch. To obtain the 250 p.p.m. concentration, 1 pound of concentrate (0.5%) is diluted with 19 pounds of bait.

Anticoagulant baits may be used for initial rodent control under essentially all conditions, using a minimum baiting period of 2 weeks. Successful rodent control with these poisons depends upon the rodents consuming a small amount of the poison almost every day for several days. Thus, it is essential that an adequate quantity of the poisoned bait be made available until the rodent population is eliminated. Consideration should be given to establishing permanent bait stations for control of rats in places which are subject to reinfestation. Two years of experience with warfarin at Savannah, Georgia, have shown that Norway rats can be controlled in non-ratproof buildings so long as poisoned bait is available, but eradication was not achieved because of the entry of the rats from outside. No difference in the residual effectiveness of the 100- and the 50-p.p.m. bait concentrations was observed. The bait stations were inspected approximately every 6 weeks and fresh poisoned bait was supplied.

Pival (2-pivalyl-1, 3 - indandione) appears, in a general way, to be approximately equal to warfarin in rodenticidal effectiveness. In both laboratory and simulated field tests, the acceptance of Pival baits by roof rats, Norway rats, and mice has been good. Laboratory tests showed that Pival and warfarin were about equally good for mouse control. Against roof rats, Pival was shown to be slightly better than warfarin in the laboratory and about the same under simulated field conditions. Both laboratory and simulated field studies indicated that Pival in solid bait was somewhat inferior to warfarin for control of the Norway rat, but that Pival-poisoned water (0.006% acid equivalent) with 5% sugar as an attractant was slightly more effective against this species than a comparable formulation of warfarin (0.005% acid equivalent). Pival concentrations in solid baits should not be less than 0.025%.

Corn meal, as well as some of the other ground grains, has proved to be a good bait material for use with rodenticides which require repeated acceptance over several days. However, in many areas the meal becomes insect infested after several days of exposure and must be replaced at frequent intervals with fresh bait in order to assure continued acceptance by rodents. Pival has been found to inhibit the development of a number of insects that infest grain, including flour beetles *(Tribolium* sp.), cigarette beetles *(Lasioderma serricorne* (F.)), saw-toothed grain beetles *(Oryzaephilus surinamensis* (L.)) and flour moths *(Ephestia* sp.). Cockroaches, however, were not affected when fed for 30 days on bait containing 250 p.p.m. of Pival in the bait.

Sodium Monofluoroacetate (1080)

Sodium monofluoroacetate (1080) is still the most effective, fast-acting rodenticide, but its extreme toxicity to man and animals requires that it be used only on certain types of premises and only by carefully trained crews. The precautions necessary for the safe use of 1080 are numerous and involved. They are described in the "Operational Memoranda on Economic Poisons" issued by the Communicable Disease Center.

Baiting Problems

In tests in Savannah, Georgia, corn meal has proved to be the most readily accepted cheap bait. In general, any available cereal may be used as bait material. It is worthwhile to restate that under certain conditions it is very difficult to get rodents to take any bait, e. g., where food is available in great variety and abundance, as in some warehouses. Such conditions constitute baiting problems, a term which implies that the origin of the difficulty lies not in the particular poison used but in the ecology of the rodents themselves. In situations where a variety of other foods are readily available to the rodents, consideration should be given to the use of anticoagulants in water with 5% sugar added as an attractant. Obviously, in testing any given rodenticide formulation, it is necessary to be certain that apparent failure of the formulation is not caused by baiting problems. These problems can be solved effectively only through extensive knowledge of the habits of the rodents. Such problems do not occur more frequently when simple cereal baits such as corn meal are used than when complex bait mixtures are used.

Midwest PCO Conf. Mar. 14-15

The 1960 Central-Midwest PCO Conference will be Mar. 14-15 at the Towne House Hotel, in Kansas City, Kans., beginning at 9 a.m. Emphasis will be on termite control with a demonstration of termite equipment.

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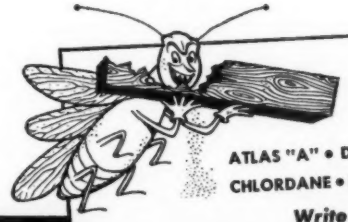

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Attendance at Arizona U's First PCO Short Course was 150, nearly double expectations.

150 Attend First University of Arizona PCO Conference in Tucson

Dr. Laurence A. Carruth, head of the Entomology Department at the University of Arizona had expected an attendance of about 90 or 100 at the first conference staged just for PCOs by his department, January 22 and 23. Instead over 150 registered for the meetings held in the University's Student Union Memorial Building in Tucson.

Sponsored jointly by Arizona U. and the Structural Pest Control Association of Arizona, general chairman for the conference was association president, John J. Dwyer.

National significance to this meeting was given by the presence of Prof. J. J. Davis, originator of PCO conferences with the first at Purdue University, and Dr. Ralph E. Heal, executive secretary of the National Pest Control Association.

Opening day lectures included those given by Prof. Davis on the "Principles of Pest Control," by G. D. Butler, Jr. of Ariz. U. on "Fundamentals of Insect Structure," and by Dr. Carruth who discussed pest control problems in Arizona through questions asked by delegates.

In the afternoon, Dr. R. A. Harvill, President of the University, welcomed the group before it began to devote the rest of the day to termite control. Ariz. U. Prof. W. L. Nutting described termite life history and habits and J. E. Bussart of Velsicol Chemical Corp. explained the principles of control. A panel then took over to discuss techniques and materials for control of these wood pests. Included on the panel were Norman R. Ehmann, Neil A. Maclean Co., El Monte, Calif.; E. H. Lemire, Shell Chemical Co., New York City; Mr. Bussart, Prof. Davis, and Dr. Heal.

Conference banquet Friday evening featured Prof. Davis who described some of the memories associated with his better than 50 years in the field of entomology.

Saturday morning's featured speaker was venomous animals expert, Dr. H. L. Stahnke of Arizona State University. He spoke

(Continued on page 59)

Three from England's largest pest control firm, Disinfestation Ltd., attended both Purdue and Arizona PCO short courses. Here they are shown in Tucson with Arizona U's entomology chief, Dr. L. A. Carruth (second from left). They are Kenneth Course (left), Alan C. Farrington, from the firm's Woodworm and Dry Rot Control Division, and William H. "Bob" Westphal (right), executive director of Disinfestation Ltd.

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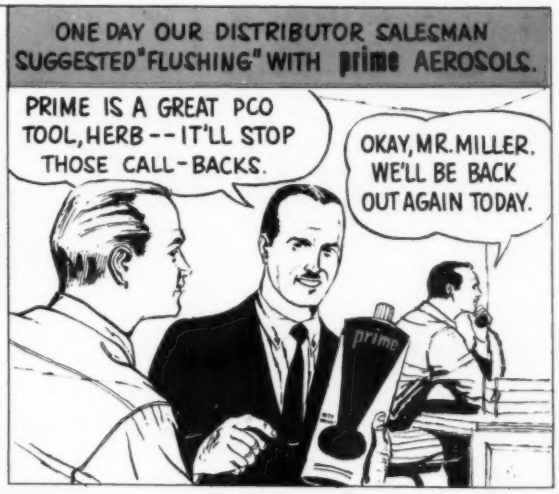

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Southern Meet Hears Safety, Results, Minimum Costs Are Industry Goals

By CHARLES G. WRIGHT, PhD
Wilson Exterminating Co., Winston-Salem, N. C.

"Anyone engaged in pest control must be able to secure results at the lowest cost, using the lowest toxicity insecticides possible to get those results, and avoid all possible hazards and risks." So said NPCA technical director, Dr. Philip J. Spear, before the 20th Annual Southern Pest Control Operators' Conference, January 18-20, at the Capitol House Hotel in Baton Rouge, La. During the afternoon of the second day, the better than 150 delegates were taken by chartered busses to the campus of Louisiana State University whose Department of Zoology, Physiology and Entomology assisted in presentation of the conference.

In his "Health Aspects of Pest Control" talk, Dr. Spear said a PCO's work covers the reduction of pest-borne diseases, of losses caused by pests on food supplies, and the use of cautious procedures which eliminate any physiological effects insecticides might have on the health of both customers and servicemen.

The most important rodent-borne diseases are bacterial food poisoning, Weil's Disease, and murine typhus, the NPCA expert explained. Potentially important are plague, rat-bites and rat-bite fever, and rickettsialpox.

Bird-borne diseases, such as ornithosis, histoplasmosis, cryptococcosis, encephalitis, etc. are becoming increasingly important. But birds and rats are not the only disease vectors, he said. Insects are also reported to be associated with rickettsialpox, murine typhus, plague, typhoid, and dysentery. Mites, ticks, lice, and related insects, are likewise the cause of personal irritations to man.

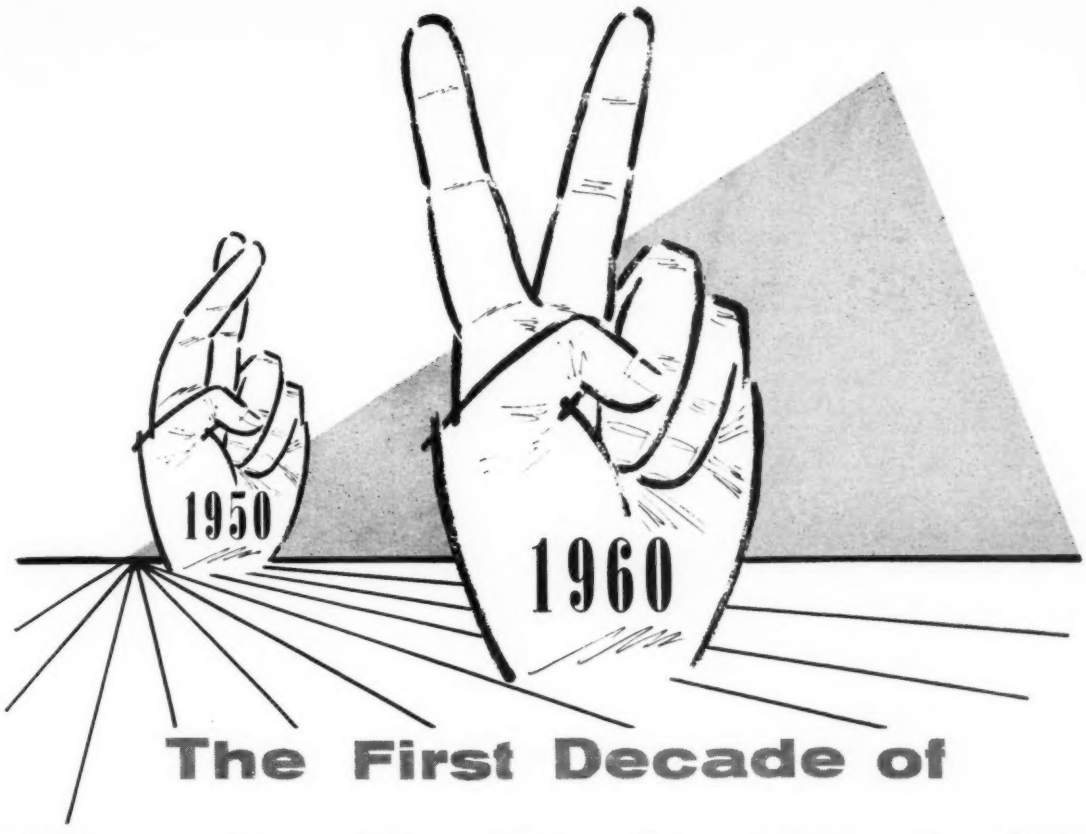
Food contamination by chemicals, as well as by pests, must be taken into consideration, Dr. Spear reminded the conferees. "Every PCO is obligated to avoid risk to others by unapproved or unsafe use of chemicals," he concluded.

Conference programmers, W. L. Seale of Seale Pest Control Corp., New Orleans; J. C. Redd, Redd Pest Control Co., Jackson, Miss.; and A. L. Norris, Norris Pest Control, New Orleans, emphasized the importance of safety by having Dr. Spear speak on it first thing opening day, and again at the closing session. I. E. Hanson, Guardian Safety Equipment Co., likewise spoke on safety during the final meeting, Wednesday morning.

"A reduction of accidents will cut down on expenses and consequently enable more profit to be made," Hanson observed. "Fewer accidents lowers insurance rates, provides less wear and tear on equipment, and reduces both injuries and work-time lost."

Closely allied with safe operations are the legal aspects of PCO operations. Richard Batt, attorney engaged by the pest control operators of New Orleans, explained that the industry's legal problems usually fall into two catagories: (1) those encountered by all businesses, and (2) those peculiar to the pest control industry. The counselor advised his listeners to consult an attorney on all legal problems, general or specific, for the success or failure of a business is often determined

Interest ran high at each session of Southern PCO Conference attended by over 150.



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Prior to 1950, prebaiting preceded baiting. Quick-acting poisons had to be carefully protected and just as carefully removed on the following day. Bait refusal and bait shyness were all too frequent obstacles to satisfactory bait consumption.

The fact that PCOs were nevertheless able to combat rats under these conditions is a tribute to their conscientiousness and skill.

Then in 1950 . . . with the coming of warfarin . . . those fingers could be, at last, uncrossed.

No more prebaiting, no more bait shyness or refusal, no more mixing fresh perishable baits every day, and no more picking up uneaten leftover baits on the morning after.

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by the way legal matters are handled.

And, Batt advised, be careful of what you say in your advertisements. "Certain forms of PCO advertising may be considered a type of contract that is binding upon the sponsor of such ads."

In other "business" phases of the conference, Louis Kotler, Kotler Exterminating Co., Memphis, Tenn., spoke on selling and advertising, and Alexandria, La., PCO Paul K. Adams, talked about the advantages of an industry-wide uniform accounting system.

"An operator must create ideas and thoughts in the minds of potential customers that will make them want to buy service," Kotler said. "Your program must develop better public relations by building confidence, trust and esteem in your fellow-men."

Adams quipped that, if for no other reason, good bookkeeping records help the PCO fill out tax forms and improve his business. "A uniform method of accounting enables operators to compare their income and cost figures with other companies to decide whether or not they are operating as efficiently as they could be," he explained.

Earwigs: Gulf Area Problem

Earwigs have become a serious nuisance pest in the Gulf states within the last few years, according to Lonnie F. Holder of Holder's Pest Control, Houston, Tex. Effective control measures seem to be lacking as is information on their biology. But, controls that have given "fair" results employ baits or residual sprays. Baits use alfalfa leaf meal, either alone or with molasses, or wheat bran, and Diazinon. An oil base spray of Diazinon and dieldrin may give some residual control, he reported.

As might be expected, the subject of "resistance" came in for its share of delegate interest at the conference.

James M. Sims, Cardinal Pest Control, Montgomery, Ala. talked about German roach behavioristic changes. In addition to the normal places such roaches are found, he said, they are now inhabiting attics, the laps on shingled houses, outside some garbage areas, piles of debris, and under unexcavated buildings. Successful control depends upon the additional treatment of such areas, Sims advised.

J. C. Redd reminded his fellow PCOs failure to control a pest is usually due to the fact that servicemen haven't gone far enough in their control procedures. "They must first locate the pest, then exterminate it, and finally insulate the premises to reduce the possibility of reinfestation," was one suggestion this Jackson, Miss. operator gave to overcome insect resistance to pesticides.

"But an important part of the resistance problem is making the customer understand the kind of difficulties operators are facing," observed Truman Thomas of the Anti-Pest Co., Shreveport, La.

For the control of resistant engorged female brown dog ticks, Clayton Wright, from Dallas, Tex. who heads up the NPCA insecticide committee, said laboratory experiments with .5% Sevin, Delnav, and Diazinon all gave good control. Sevin dust at 5% gives good control of these ticks out-of-doors, he reported, while Delnav or Diazinon in oil at the percentages recommended by the label, gives good control of them indoors. Comments from the floor revealed delegates are having dissimilar experiences with silica aerogel dusts for roach control. Some observed that they cause roaches to frequently migrate

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This product contains two pounds DDVP Technical per gallon in an emulsifiable concentrate form. DDVP is a new insecticide for control of many household insects such as Roaches, Flies, Fleas, Brown Dog Ticks, Waterbugs, Carpet Beetles, etc., This is a quick action type insecticide killing by fumigation, as well as by contact. This product is used by the Pest Control Operators for roach clean-out jobs where spectacular results are desired. General recommendation for Roach Control is 1½ ounces of spray concentrate diluted with one gallon of water.

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from one building to some other.

"Biological Factors in Rodent Control" were explained by Dr. B. R. Evans of the Foreign Pest Quarantine Station in New Orleans. After a discussion of the biology of the three most common rodents—Norway rats, roof rats, and house mice—limiting factors in their control were explained. These limitations are, he explained, (1) their physical environment, (2) the predation of one species on another, and (3) the competition within a species. "Each environment can support only so many individuals, thus the most permanent type of rodent control is achieved when their environmental needs are made unfavorable for the development of rodent populations," according to this authority.

Dr. George Lowery, Director of the Museum of Natural Science in Baton Rouge, said the rodent commonly called the roof or black rat may actually be one of three subspecies: the roof rat, black rat or white rat. Differences between these and the brown or Norway rat were explained. He also told PCOs mole and pocket gopher burrows may be distinguished by noticing that the mole burrows near the surface, pushing up the dirt, while pocket gophers burrow far below the soil surface.

Termite Soil Fumigants, Chemicals

"Soil Fumigation for Termite Control" was to have been covered by Karl Hassler, of El Monte, Calif., but because of his death early in January, PCO A. L. Norris read the paper written by Mr. Hassler. Ethylene dibromide, most commonly used fumigant for sub-soil termite control, has given good control in experiments conducted during the last few years, Hassler wrote. However great caution must be observed when the material is used, and all safety precautions must be taken to prevent unintended dispersion of the gas. "This control method has been successful when others failed," he observed.

Dr. Virgil Smith, of the U.S.D.A.'s Forest Research Laboratory, Gulfport, Miss., told the conference several insecticides, in stake and ground board tests, have prevented termite attack in wood under outdoor conditions. Aldrin, chlordane, dieldrin, and heptachlor have prevented termite attack on the test wood since initiation of the tests, which range from 7 to 12 years.

A plaque for Dr. O. W. Rosewall, Emeritus Professor of Entomology at LSU, was presented by Hubert L. Joyner (right), secretary of the Louisiana PCA, in recognition of Dr. Rosewall's many years of service to pest control. The professor was also made a lifetime member of the association.

Dr. Ralph E. Heal, NPCA executive secretary, told delegates to this meeting about the proposal by an insurance company to provide association members a warranty for treatment and repairs in connection with termite treatments. The plan is still in the formative stage and further details are expected soon, he advised.

Other speakers on the three-day program included E. A. Cancienne, State Entomologist for Louisiana who spoke on his state's pest control law which has been in existance since 1930, reported to be the first of such legislation regulating PCOs. NPCA president, Harold Schnorrenberg, Dead-Shot Chemical Co., Oklahoma City, Okla., talked about termite control equipment, and LSU's entomology professor, Dr. Edward Burns, assisted by Dr. Spear, discussed ectoparasites and showed slides to help PCOs properly identify the ones they frequently encounter.

One afternoon was spent on the LSU campus where ectoparasite and rodent identification were studied.

General chairman for the Southern PCO conference was William I. Elo, Elo Exterminating Co., San Antonio, Texas. A.L. Dugas, Dugas Pest Control, Inc., Baton Rouge, served as local chairman. Attendance and publicity were the responsibility of Truman Thomas, while James M. Sims was in charge of commercial booth exhibits, and Stanley McKenzie, McKenzie Pest Control, Lake Charles, La., finances.

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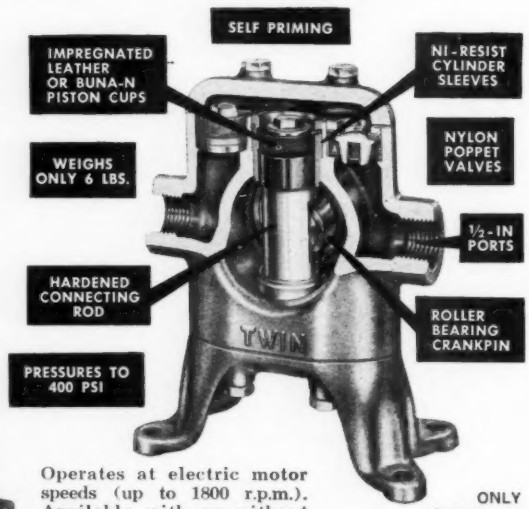

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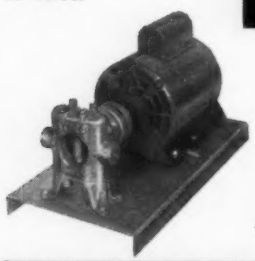

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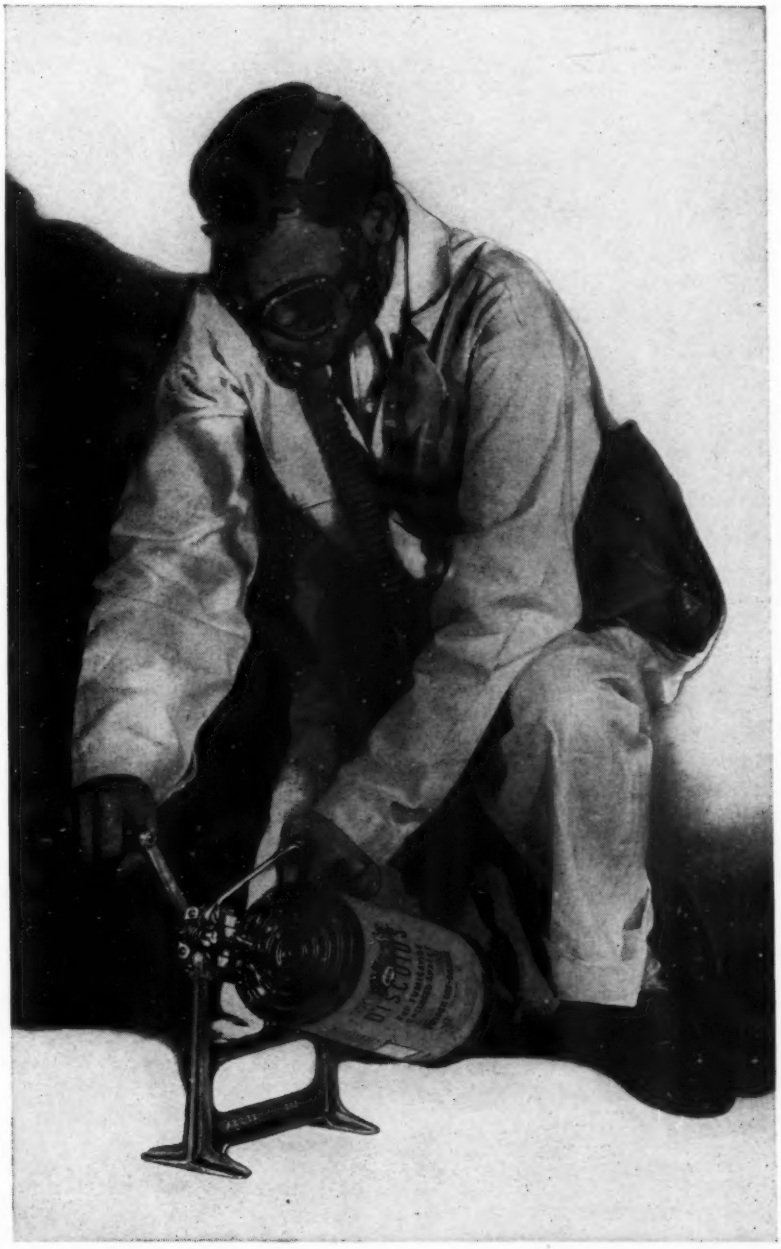

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Phosphate Resistant Roaches Coming?

NPCA's Dr. Spear Says to Eastern PCO Conferees, "It's Probable"

by WILLIAM J. FISCHANG

Graduate Student, Department of Entomology and Plant Pathology
University of Massachusetts, Amherst

The probability that cockroaches may become resistant to organic phosphate insecticides was revealed by NPCA Technical Director, Dr. Philip J. Spear, recently. He was addressing the 145 delegates to the 20th annual Eastern PCO Conference, January 27-29, at the University of Massachusetts in Amherst.

"We believe that we are practically on the threshold of this kind of resistance in some of the Texas areas," he said.

Country-wide, however, the organic phosphates, particularly Diazinon, are now the "backbone of our control measures" against chlordane resistant roaches, members of a roach-panel reported. For initial cleanout, up to 1% Diazinon is used, but for normal control maintenance 0.5% is the recommended dosage.

Dr. Spear considers the major problems in using Diazinon are (1) that it has reduced effectiveness when applied to hard surfaces such as stainless steel, glass, and ceramic tile, and (2) that it has what some may consider an objectionable odor. The odor problems can be minimized, he said, if sprays are used as soon as possible after dilution.

Dr. Spear also revealed that both chlordane and Diazinon develop some degree of repellency with the aging of residues.

When resistance to the phosphates does develop, the NPCA official suggested that carbamates, such as Sevin, may provide the next alternate chemical group for dealing with this problem.

"It's truly a fascinating new development!" Dr. Spear said about the status of DDVP. "At the moment," he continued, "this insecticide is not registered for interstate sale, but before we meet again, I'm sure it will be."

An organic phosphate, DDVP kills primarily by vapor effect and dosages will be expressed, not in percentages, or ounces per square foot, but in weight per unit of space, as with fumigants, he explained. It appears to be promising against several pests, including cigarette beetles, roaches, and flies.

Dibrom, a new phosphate insecticide, and Vikane, a Dow fumigant, are two additional materials which are now showing promise, according to Dr. Spear.

Most members of the roach panel emphasized the need for unusually thorough applications in order to successfully control resistant cockroaches.

"Homing instinct," the tendency of roaches to congregate or return to a specific "home," was recalled by Dr. Harvey L. Sweetman, University of Mass., as being an important characteristic for PCOs to consider in evaluating the effectiveness of residual insecticides.

Colvert E. Moore, Eastern Chemical Service, New London, Conn., said, "I am inclined to take the simple approach in believing that resistance always existed in the presence of any particular insecticide, but that it never manifested itself because of the enormous preponderance of so-called normal roaches. Now, over a period of time, the normal insect population has become almost extinct at least in my area, and these super or resistant insects . . . prevail."

To control resistant roaches, Dr. John V. Lembach of Residex Corp., Linden, N. J., suggested applying a residual insecticide first, followed by use of pyrethrum to irritate or flush the insects to make them run over the residual deposit.

Ectoparasites Studied

Ectoparasites of man and his pets were the central theme for the two and a half day conference that gave PCOs up to the minute information through panel discussions, laboratory exercises, lectures, and informal sessions.

Second morning of the meeting was occupied by four rotating laboratory sessions. Members were guided through studies of **ticks, mites, fleas,** and lice. In the afternoon, two lectures on ectoparasites were featured.

Dr. Norman Ward of Ward's Animal Clinic, Worcester, Mass., said that fleas and ticks constitute his major ectoparasite problems on dogs and cats. As in some other sections of the country, the brown dog tick is the most important pest tick in the Worcester area. Dr. Ward stated, "It is one of the few, if not the only tick, which has adapted itself to live in heated environments." Thus it may live and breed continuously in homes, without regard to weather. The wood ticks, also important pests, must hibernate in winter. While chlordane, DDT, and gamma BHC had been successful control agents, resistance to these materials has appeared in the past two years in Worcester, so that an organic phosphate acaracide must now be used. Pyrethrum is also useful if isopropyl alcohol, at 4 ozs. per gal., is added to improve its killing action.

Dr. Ward stressed the need for veterinarians and PCOs to come to a mutual understanding on flea or tick control. Advocating that each should remain in his own field, he said, "I believe the only effective way to avoid overlapping is for the PCO to handle the premises and the veterinarian to handle the animal." PCOs

Eastern PCO Conference delegates learn present roach controls no panacea.

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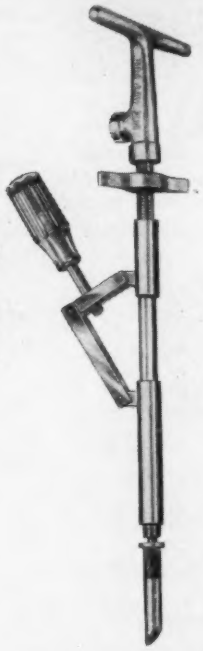

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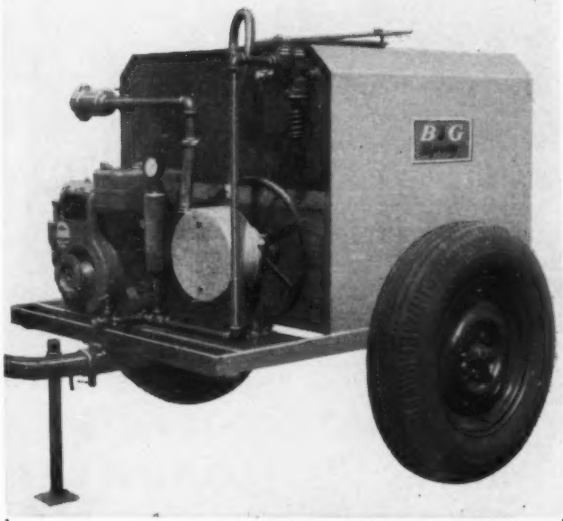

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should avoid treating animals, he emphasized, for poisoning may likely result.

Dr. Henry S. Fuller, Walter Reed Army Institute of Research, Washington, D. C., captured the attention of the conference with a stimulating discussion on the early history of pest control. He suggested criteria (similar to Koch's postulates for microbes) for the incrimination of arthropods as vectors of infectious agents.

He discussed the non-fatal, louse-borne, human disease known as trench fever. Explaining that the causitive organism lives in the lumen of the louse, Dr. Fuller said the disease may be transmitted through louse excreta or by crushing lice on the skin. The disease characteristically plays havoc in disaster situations where large numbers of people are forced to remain unclean, in close quarters, "sharing their lice." "Somebody in the United States has to worry about survival diseases!" he exclaimed, and emphasized the need for being prepared to combat such diseases which, while not causing loss of life, can seriously incapacitate populations or military troops.

In a general discussion on control of ectoparasites, several suspected cases of pesticide resistance were mentioned, including those involving bed bugs, fleas, and brown dog ticks.

Using Diazinon, Martin T. Meyer, Theodore Meyer, Inc., Philadelphia, Pa., was unable to control dog ticks. On the suggestion of Dr. Spear, he experimented successfully with Kelthane. "So far it has promise," Meyer commented, but Dr. Spear cautioned that Kelthane is not registered for this use and suggested Delnav as a useful organic phosphorous material for ticks.

"I would say that Diazinon and Delnav are your two best materials if you have tick resistance," Dr. Spear concluded.

Clayton Wright of C. Wright Associates, Dallas, Texas, reported he has found that when using Delnav for brown dog ticks, as prescribed on the label, he has to retreat approximately 2 cases out of 10, depending upon the life cycle stage of the ticks at the time of treatment.

House Borer Increasing

In recent years there has been a tremendous increase in the number of attacks by the old house borer in the USA, according to a report given by Dr. Thomas McIntyre of Laurel Research Center, U. S. Forest Service, Laurel, Md. Since the old house borer is already a very important pest in other parts of the world, he feels concern about its future importance in this country.

"We are finding now that the insect is in new housing developments," he said. McIntyre explained that the borer is found mostly in sapwood and only in coniferous woods. Since the present building boom in the U. S. has caused the use of much second growth wood (largely sapwood), satisfactory conditions for the old house borer are increasing.

To control this pest, Dr. McIntyre advised that "Fumigation is the one way out where heavy infestations exit." Both methyl bromide and hydrogen cyanide have been successful. For small localized infestations, Dr. McIntyre said surface treatment with Ultrasene at 1.5 pints per cubic foot will give control in 12 to 16 weeks. He cautioned PCOs

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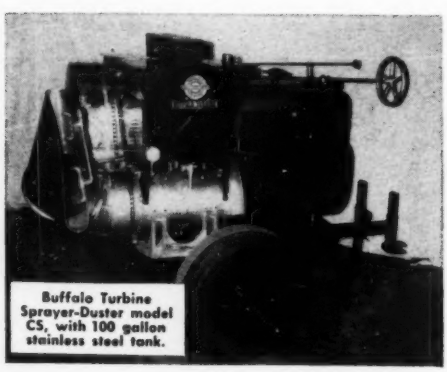

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that the old house borer is able to live and reproduce in homes, whereas other roundheaded borers cannot. "Therefore it is essential that borers be properly identified," he said.

Standards for Realtors

Two major business problems related to termite control were introduced by Dr. Ralph E. Heal, NPCA executive secretary.

He outlined the need for a standard method of reporting termite inspections for real estate transfers. It was generally agreed that varying requirements of different loan agencies were injecting a great deal of inconsistency and confusion into pest control policy.

If we, the industry, could make up our minds as to what the public should expect from us, Dr. Heal said, "It would become the law of the land!"

He also presented for consideration a proposed "Insured Service and Repair Warranty" sponsored by the National Pest Control Association. Such a termite control guarantee, he explained, would have the advantages of providing a sales tool, protecting the public, and protecting the operator from excessive damage claims.

Bird Control By Phone

A telephone report on bird control from Springfield, Ill., highlighted one part of the program. The voice of George L. Hockenyos, of Sentinel Laboratory, came in clearly through the public address system as he described the use of 10% ammonia (with a wetting agent) to drive starlings from downtown Springfield. Applying the ammonia in water with a mist blower directly onto the birds as they perched on building ledges, drove away 99% of the starlings in one week.

The use of the telephone, a "first" in Eastern Conference history, was caused by adverse weather at the Chicago airport.

Mr. Hockenyos finds that pigeons can largely be controlled in Springfield by locating and closing the entrances to their sheltered hatcheries in buildings, under eaves, etc. Approximately 460 birds were removed from accessible hatcheries in 1959, and he feels that this will have a marked effect on the size of this year's population. In addition, traps were set, and an average of 12 birds per day were captured in this manner.

Down to Business

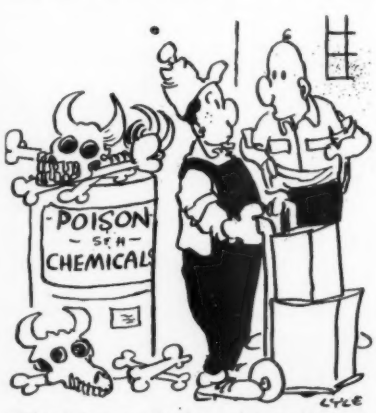
At the very beginning of the meet, delegates spent a major part of the first day getting down to the business aspects of pest control. Four panels examined fundamental problems of the industry. Panel chairmen were Aaron Fleischer, Astor Exterminating Co., Cambridge, Mass.; Corys Heselton, Abalene Exterminating Co., Pittsfield, Mass.; J. Arthur Jones, South Jersey Exterminating Corp., Camden, N.J.; and Guy V. Dale, Exterminating Services Corp., New York City.

Public relations at the local level were enthusiastically discussed. It was suggested PCOs must become known and respected in their communities through long standing good business practices and active participation in political, church, and civic affairs. Servicemen must be chosen with care and be trained to represent themselves to the public as well-mannered, knowledgeable, and neat personalities. Straightforward, honest advertising was considered important, as well.

Marks of Respect

Whether or not vehicles and uniforms should be marked with the company name was vigorously debated. Recognition was made of the fact that nearly all southern and western PCOs use marked vehicles and uniforms, while some northeasterners feel they are forced by public reaction to conduct business in a confidential manner.

The spirited discussion was concluded with remarks by Dr. Heal, who said in effect that PCOs should not stand by, waiting for the public to force them to mark their vehicles, but rather should hold themselves and their businesses in greater respect and hasten public acceptance by proudly marking their cars and uniforms.



"The label on the barrel is sufficient. We can get along without the props."

Contented Servicemen

Servicemen's training occupied another panel discussion. Panel chairman, Guy Dale, revealed that his primary secret for keeping loyal, efficient servicemen is his own personal desire to keep his men happy in their work. He said the PCO should keep close to his men and their problems.

It was implied by the panel that while wages should be commensurate with ability, pay as an incentive is secondary to pleasant working conditions. It was suggested that "bull sessions" should be conducted with the men in order to draw out unseen problems and to distribute new ideas; that men should not remain servicing the same routes too long, but should occasionally be shifted; and that when a man is found by authorities to have been negligent in a driving accident, he should be required to pay the deductible portion of the insurance coverage.

A uniform system of operating ratios was proposed by Max Carasso, Abalene Pest Control Service, Inc., New York City. He discussed the NPCA "Uniform Accounting Manual" and concluded, "With some ratios to go by, we'll be able to do business more intelligently."

Robert Kofoed of Fogging Unlimited, Inc., Red Bank, N. J., called attention to the NPCA "Check List of Insurance Coverage for Pest Control Firms" which provides an excellent summary of a firm's insurance program and alerts operators to their insurance needs. He advised PCOs to carefully examine their property damage policies to be sure they have the coverage for damage to property in their "care, custody, and control" while treating. Such damage is excluded by many policies, he stated.

"Come back in '61"

Addressing the conference, Dr. John H. Lilly, head of the university's Department of Entomology and Plant Pathology, extended an invitation to hold the 1961 conference at Amherst again. According to Dr. Frank Shaw, also of the department, the 21st conference is tentatively scheduled for January 25-27, 1961.

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'60 Purdue PCO Conference drew record 437 to the University's 24th industry short course.

Pesticide Usage by PCOs May Soon Be Regulated By Food Additive Law, Purdue Conference Learns

Pest control operators who pitied the plight of cranberry growers last Thanksgiving, because of their financial losses resulting from the widely publicized ill-timed application of an herbicide which caused cancer in test animals, had better take a closer look at their own pesticide application procedures. The muscular arm of the new Food Additive Law, which brought on the cranberry crisis, is being extended to include all pesticides used by any pest controller wherever food is involved.

This was the sobering news heard by 437 delegates to Purdue University's 24th Annual PCO Conference, January 31—February 5. With lectures, floor discussions, and bull sessions, the university put on a high-powered five day program keyed to update neophytes and industry executives with practical biological and control information, and to alert them to the serious implications of legislative restrictions under which their work will be increasingly governed.

Ectoparasites were the "pest of the year," but PCOs also attended classes on termite, bird, rodent, ant, roach, and ornamental pest control, as well as sessions covering chemicals, resistance, labeling, and insurance.

Every Spray Food Additive

"Anything the safety of which has not been established and that may become, or does become a component of food, becomes a food additive." So advised Dr. Charles Durbin of the U. S. Food and Drug's Veterinary Medicine Division, Washington, D. C. And, "practically every spray PCOs are using can be classified as a food additive because we just don't know all the actions to the toxic components being used," he reported.

This lack of basic information has resulted in "zero" tolerances being set on most pest chemicals used on, in, or around food and food products.

"A 'zero' tolerance," Dr. Durbin explained, "is the tolerance based upon the sensitivity of the method used to detect that compound in food, or in anything else. Most of our assay methods run about .8 of a part per million, depending upon the toxicity of the compound. That's 'zero.' We are satisfied that if there is such a slight amount of the compound present it would be safe; otherwise we wouldn't permit even a 'zero' tolerance.

"When you're working on farms, or in milk barns, you have a legal and moral responsibility to take every precaution to prevent contamination of milk supplies," the FDA official warned. "For example, the use of DDT on cattle in barns is strictly forbidden. You are not even supposed to use DDT in a dairy barn. There is a tolerance of 7ppm in meat, but none in milk."

It is likewise the PCO's responsibility to warn management personnel for meat packers, food processors, and warehouses, of the inherent danger potential present when service contractors are required to put out poisonous rodent baits. Such customers must be told to avoid any careless practices which may result in contamination of food through contact with these rodenticide placements.

Throughout the conference, Dr. John V. Osmun, Purdue entomology department head, and National Pest Control Association executive secretary Dr. Ralph E. Heal, repeatedly reminded delegates that the very future of their industry depended upon how carefully they supervised their operations to be sure there is no misuse of pesticides.

"Cranberry growers who did not pay any attention to spray timing established by law, and put the herbicide on their crop just prior to harvest, got into trouble. By the same token, PCOs who spray materials around that can get on food, and can contaminate such food, can likewise get into trouble, too," Wood Treating Chemicals director of research, Ira Hatfield, told operators.

"Such action can bring upon the industry problems that we don't want to face. These rules and regulations are set up in order to protect the health of your workmen, the public you are serving, as well as your own." Legal problems are minimized when firms read and follow regulations established by laws covering their operations, Hatfield said.

But ectoparasites, insect fragments, rodent hairs, excretia, etc. found in food are also contaminants, and food handlers who permit any of these deleterious items to get into their products will be hauled into court. Thus, the PCO who tries to prevent insect and rodent contamination with pesticides, and his foodman customer, are caught in the squeeze of federal legislation that forbids the presence of both pest fragments and the chemicals used to control the two-, four-, six-, or eight-legged culprits that foul edibles.

Purdue's Dean E. L. Butz aptly remarked that new control meth-

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FDA's Dr. Charles Durbin. confers with Dr. Philip C. Stone, head of Missouri U's entomology department, about the need for greater caution in the application of pest control chemicals.

ods will be developed that no one has yet thought of. If they can solve the restrictive puzzle confronting PCOs, such new controls can't come any too soon, industrymen agreed.

Parasitic Disease Vectors

Control of ectoparasites, in food plants and elsewhere, must be an integral part of many PCO service offerings because of the human diseases these tiny creatures carry. The U. S. Public Health Service's Communicable Disease Center in Atlanta, Ga., sent its John Bagby to talk with PCOs about the health aspects of ectoparasites.

"Parasitism exists in many forms and may be classified by many systems," Bagby explained. "There are parasites which may be free-living at will. There are 'intermittent' parasites, such as mosquitoes, which prey on a host only infrequently. Others may be classified on the basis of the site of their existence, such as 'endoparasites' which live within the body of the host, and 'ectoparasites' which live temporarily or permanently on the outside of the host's body.

"The importance of ectoparasites and the diseases they share with man is well established and of long duration," he continued. "It is true that the incidence of communicable diseases has been dramatically reduced in recent years, and that therapeutics for treatment of the reduced numbers who contract the diseases have been just as dramatically improved.

"These facts are comforting, but should never be allowed to become satisfying. There are at least 6 vector-transmitted diseases which still require the development of control measures: encephalitis, tularemia, Colorado tick fever, Q fever, plague, and Rocky Mountain Spotted Fever. Four are transmitted primarily or solely by ectoparasites," according to this USPHS representative.

It was because of their ability to carry deadly diseases that ectoparasites were chosen by delegates to the 1959 Purdue meeting to be the "pest of the year" for this year's conference.

The best part of one whole day was spent studying the biology of mites, ticks, fleas, bedbugs, and lice, with an hour session devoted to laboratory identification of them. Instructors for these sessions were Dr. Philip Stone, head of the department of entomology at the University of Missouri; Dr. Roger Drummond, from the entomology research laboratory run by the U. S. Department of Agriculture in Kerrville, Texas; and Purdue staffers Dr. Raymond M. Cable, professor of zoology; R. C. Dobson, assistant professor of entomology; Dr. Howard O. Deay, professor of entomology; and William L. Butts, instructor in entomology.

R. C. Dobson (center), assistant entomology professor at Purdue, answers some specific questions, after his lecture on bedbug and louse biology, asked by PCOs James J. McDaniel (left) of Chicago, and Robert M. Lewis of Muncie, Ind.

After learning which of each species requires control and how to identify them, the alternating concurrent sessions closed down for a general panel discussion of effective chemicals. Resource personnel were Dr. Drummond, Clayton Wright, head of the NPCA insecticide committee, from Dallas, Texas; William E. Hazeltine, graduate entomology assistant at Purdue; and Dr. Lee C. Truman, Pest Control Services, Indianapolis, Ind., who chaired the panel.

Chemicals for Ectoparasites

For **mites**, panel members reported no resistance has been developed in the laboratory and apparently recommended miticides are working in the field.

The **foul tick or blue bug** can be controlled with a number of insecticides, Dr. Drummond reported. Among them, he says the USDA recommends 5% DDT, 2% chlordane, and 1% lindane sprays, but chickens and all food materials, water, etc. must be removed when applications are made. Spray approximately 1 or 2 gals. per 1,000 sq. ft. in chicken sheds or houses, he advised.

On the West Coast test work is being done with some of the relatively new insecticides to control this tick. One is malathion used as a 3% spray to cover the house and roofs. Others are toxaphene, chlordane, lindane, and 1% Diazinon. The effectiveness of treatments with these chemicals depends upon how thoroughly they are applied.

"Foul ticks are notorious in their hiding habits," Drummond explained, "they only come out of their niches and cracks when they have to feed. They spend most of their time deep, down in some wedge of a board, underneath trays where food is kept, on the roofs of henhouses, etc. In the South these ticks tend to leave the roof to do their hiding and are often found in the bark of adjacent trees, etc.

It is important that areas under treatment be covered with spray completely. Added spray pressure is suggested to make sure the insecticide penetrates cracks. If there is a tar paper roof over the shed, and cracks in the boards beneath it, get the insecticide under the tar paper and into such cracks to realize better control, Drummond explained.

Korlan, also known as ronnel, at .2% suspension was reported to give "very fine" control of the foul tick. The carbamate, Sevin as a 1% spray also gives "excellent" control, he reported.

Dr. Roger Drummond, of the USDA's entomology research division in Kerrville, Texas, talked about tick biology and control.

Dibrom and Dipterex were found to be ineffective in giving complete control of foul ticks.

Hens can be treated by using a malathion dust that gets rid of some of the immature stages, especially larvae, but the main emphasis should be placed on areas around the chickens themselves rather than on the birds.

For the **brown dog tick**, first of all take the pet to a veterinarian, the USDAman said. The vet will probably use a DDT dust or wash, or a rotenone dust or dip, or perhaps lindane. Delnav, as a .015% dip for dogs was recommended as being effective. This chemical, available as a 30% emulsifiable, can also be used as a premise spray.

At the Orlando, Fla. USDA laboratory, experiments have shown that a single application of emulsifiable Diazinon at .5% is effective in getting rid of the brown dog tick problem.

Malathion, at 1%, gives "fair" results if tick populations are not too high and pen surfaces are not made of concrete, according to Drummond. Several failures have resulted when malathion was applied to kennels where walls have been made of concrete block. The chemical tends to break down when it comes in contact with the alkaline surface. Doubling the strength of malathion to 2% is reported to have given "excellent" control even after one week following treatment.

Sprays in homes need to be directed to high places, above head height, on walls, curtains, behind picture frames, under rugs, and other areas where you wouldn't normally expect to find the brown dog tick.

To control **wood ticks**, Drummond told delegates to use 1 to 2 lbs. of DDT in 5 to 50 gals. of spray per acre, depending upon the vegetation and topography; or 40 lbs. of 10% DDT dust per acre. The opinion of delegates was that this tick is "self-eliminating" indoors. Populations are found in houses, but they are reported to be somewhat accidental, having been brought in. Inside, wood ticks seem to go through a molt or two, but they do not stay in the house because experts say these ticks seem to prefer to be outdoors. Successful treatments have concentrated on outside area control. The government entomologist said applications on foliage should go up as high as 2 ft. since ticks will climb that far up in their search for something to feed upon.

In addition, he said, toxaphene, chlordane, and dieldrin, applied at the rate of 1 to 2 lbs. per acre as a spray, or 40 lbs. per acre as a 5 or 10% dust, gives "excellent" control.

The USDA recommends that repellents be used to keep ticks off man.

In the Texas area, since 1955, PCOs have been using .5 to 1% malathion dust, emulsion, or oil solution for **dog and cat** flea control, Clayton Wright reported. Some Diazinon is also being used in those few areas where operators are experiencing trouble with malathion. After the pet has been taken to the vet for treatment, spray the yards completely and make a thorough treatment inside the house, Wright advised.

Bedbug resistance has not developed in all sections of the country, if the vote taken among delegates from 34 states at the Purdue meeting is representative.

But where DDT no longer works, Purdue PCO extension man William Hazeltine recommended malathion for perimeter treatments, excluding beds and

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bedding. Lindane at .25 to .5% works well in situations where resistance to it has not developed. No more than .1% lindane is permitted for use on mattresses, but .5% is approved around baseboard areas. Some operators said they use chlordane around the room.

To boost the activity of lindane, and give it a "sure knockout" effect, Robert C. Yeager, conference chairman and manager of Rose Exterminating Co., Cincinnati, Ohio, told the group he adds a quart of Lethane to a 5 gal. mixture of lindane.

Fly Control Trends

Because of resistance, most PCOs attempt to keep away from fly jobs, but Sentinel Laboratory of Springfield, Ill. has long been involved in providing control of flies at their state's annual fair and has handled the assignment with a thoroughly integrated program.

"Scientific methods have brought fly control to the State Fair in Springfield, Ill., at a cost of less than one cent per visitor," Sentinel's manager, Arthur W. Gibson, reported at a special evening session. "Each year, however, operations are varied to meet the changing picture in fly resistance."

Recommended fly controllers, such as DDT, chlordane, and lindane have been ruled out at the Fair for adult fly control, because of resistance and special sanitation problems. "It has been determined that a Diazinon-sugar bait spray will probably be used for the 1960 fly control program," he explained.

For spot adult control, volatile DDVP is scheduled for use again this year. Because of this chemical's space vaporizing properties that give rapid knockdown, Gibson reported it shows promise for controlling "flesh" flies and others not controlled by sugar bait or contact spray.

But any successful fly program at a vast state fair needs all-around cooperation when it comes to sanitation maintenance. Sentinel has built up an understanding of this fact with fair management personnel and participants in the exhibition.

"The most grateful indicator of this progress is the fair concessionnaire who has learned the blessing of good fly control," Gibson concluded.

Answers to Resistance

As any PCO knows, who's been in business for five years or more, resistance headaches are not confined to control of ectoparasites and flies. Roaches, mosquitoes, etc. have developed hardy strains that are no longer killed by insecticides which once worked.

Dr. James McD. Grayson, head of the entomology department at Virginia Polytechnic Institute, Blacksburg, said "Resistance is simply Darwinian selection," or survival of the fittest.

Is there an answer to the resistance problem? Dr. Grayson doesn't think so. He said there was a thorough symposium in Washington last October attempting to come up with some solutions, but representatives to that meeting of experts all came away without any new clues to the answer.

Scientists have developed some suggestions, Dr. Grayson explained, but he quoted Dr. Edward O. Wilson of the Biological Laboratories of Harvard University, who says that "all of the methods seek to manipulate normal physiological or genetic processes in such a way as to cause the best species to expend its own energy in destroying itself."

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But there are other proposals, and here are the ones the VPI entomology chief presented:

A bit old-fashioned is the recommendation to reduce insects' breeding potential, but it's one that's often overlooked. Confidence in the performance of DDT after the war, lulled the public into thinking they could be as careless as they wanted since any insect could easily be killed with this "hope-chest" chlorinated hydrocarbon. This is particularly true with the housefly that was among the first to resist DDT.

Former-day pesticides, such as the inorganics and low toxicity materials, once more are successful for control of resistant species in some areas. Among them are sodium fluoride, used for roach control, boric acid, arsenicals, fluorines, and other materials, not very well thought of today because they do not give the sensational kill PCOs have come to expect, and because some have considerable hazard. But Dr. Grayson reported these and other pre-World War I chemicals still have a real place under some conditions, such as in out-of-the-way places where there are no hazards, and where they can be left to do the job for the next six months or so. "To our knowledge, resistance to sodium fluoride has never been shown on the part of any insect," he reported.

The currently popular industry answer to insect resistance is to use alternate insecticides. German roaches, once controlled with chlordane before it became ineffective, are now primarily being brought down with Diazinon, Dr. Grayson continued. "One of these days we may have to find a substitute for Diazinon, and malathion, but we feel we're in pretty good shape in the development of alternate roach killers. Houseflies are a more difficult problem. I don't know what we're going to do about them," he said.

Delegates asked if they should continue using one pesticide until its effectiveness runs out and then switch to another, or should they use a "razzle-dazzle" system of alternating materials as they go along?

It was Dr. Grayson's opinion that the best procedure is to use a material as long as it does the job. When it definitely begins to fail, switch to another pesticide, perhaps of a different chemical group. He said there's much disagreement on this stand, but one position is just as well substantiated as another.

"With a limited number of insecticides in our arsenal, and with a limited number of groups, such as the chlorinated hydrocarbons, phosphates, organics, and carbamates, it looks pretty inevitable that we're going to run out of insecticides one of these days," Grayson predicted.

Some biological and chemical control procedures have successfully brought control of insects like the screw worm fly which was effectively eliminated in one section of the country by sterilization of the males. Another method utilizes hormones to upset metamorphological development. A third technique, being tested by the USDA in the South Pacific on Mexican fruit flies and Melon fruit flies, annihilates males. A very attractive bait is used to attract the male fruit flies which will then be killed. Females thus will not be able to mate.

Use of an insect's own hormones against itself to disturb its natural physiological development is still another idea proposed.

Harvard's Dr. Wilson has sug-

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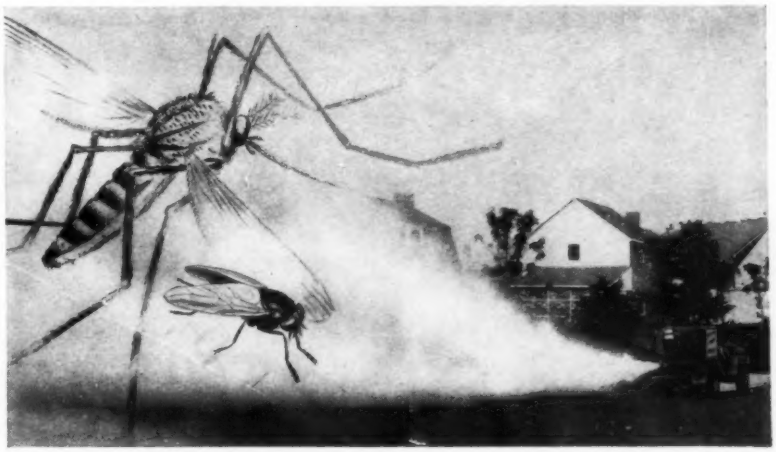

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gested it might be possible to break the normal sleeping period of insects and cause them to come out at the wrong time and thereby eliminate themselves. Still another proposal is to interfere with insects' so-called copulation dynamics.

Dr. Grayson said, "What we really need is a chemical that will select in the wrong direction. Instead of selecting for resistance, it will select for susceptibility. Some promising developments along this line have been realized, but successes of initial experiments so far cannot be duplicated."

Sorptive Dusts

While delegates did not feel sorptive dusts are the entire answer to resistant roach control, speakers on this subject, James Steckel of Tornado Manufacturing Co., Columbus, Ohio and Dick Thomas, Montgomery Pest Control, San Francisco, California, did report they have had generally good results with the fluffy stuff where they've used it.

Users favored the heavier formulation of silica aerogels because it reportedly is easier to handle.

Steckel cautioned PCOs about using such powders around electric motors. The dusts cause a breakdown in their lubricants, he said. He reported the silica-gels have a drying effect on the skin, but that normal moisture returns in a few days after they've been used.

Should PCOs use sorptive dusts on animals to control fleas? Dr. Heal said "No"; Dr. Osmun said "No"; they both emphasized that treating animals was the job of veterinarians, not PCOs. Food & Drug official Charles Durbin warned "the use of dusts on dogs makes them a new drug and PCOs might get into trouble using them before Federal registration of the use has been granted. Such registration has not been approved."

Federally Approved Labels

If PCOs use only products that have been approved by the Federal Insecticide, Fungicide and Rodenticide Act, and state labeling agencies, they have an "umbrella of protection" if a legal claim is made against them based upon the pesticide's performance, Ira Hatfield told the conference during his lecture on what insecticide labeling means to the PCO.

"And in no case," he cautioned, "can you legally give insecticide to anyone in an unmarked, unlabeled container even if you are not involved in over-the-counter retail sale of pesticides. Once you do, you are in violation of the Federal IF&R Act, and any state labeling law if your state has one."

Serviceman Dilution Practices

As part of its program that got down to the grass roots of the industry, Purdue arranged for a panel to answer questions about how companies handle the dilution of pesticides by servicemen on the job.

"When a 2% formulation is made up, is it done by volume or by weight?" one delegate asked. "Definitely, always, and every time, by weight," was the answer from panelist, Herman E. Flanagan, State Termite Co., Canton, Ohio.

"Are servicemen generally using materials that were diluted at the plant and made ready for use, or are they preparing them on the job?" another PCO inquired.

Panel member Wendell V. Jordan of Arab Termite & Pest Control, Indianapolis, Ind., answered

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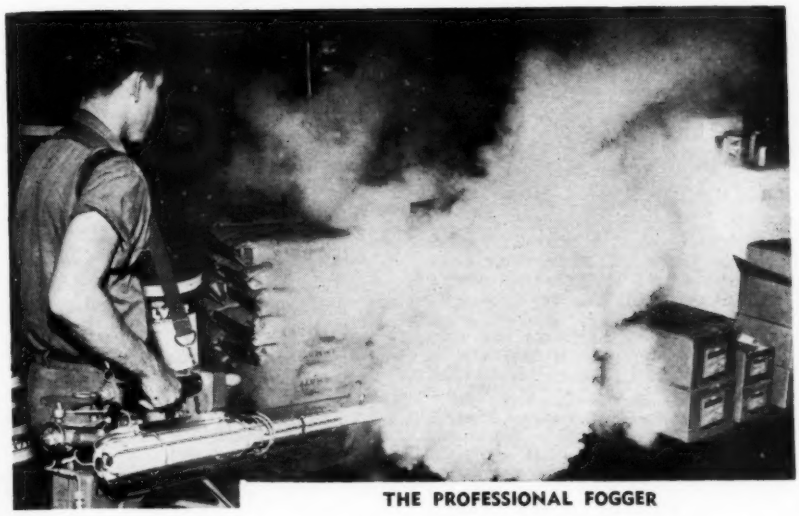

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from his own experience. "We make it a point to design our containers according to the way the man is going to use the material on the job. Our emulsifiables, which are used continually during the day — chlordane, Diazinon, malathion, etc. — are packaged in small containers — 4 oz. for 57% chlordane, 2½ oz. for Diazinon,— which is just enough to make up the one gallon of solution that fills the one-gallon sprayers our men use.

"The oil solutions, which are not used as often," Jordan explained, "are given to our men in 5 gallon cans, ready for use — 1% Diazinon, ½% Diazinon, 2% chlordane, and ½% lindane."

"How do you keep a serviceman from doubling the amount of water he might use if he is left to make the dilution on the job by himself?"

Bill Ives, Rose Exterminator, Detroit, answered this one. "It's a matter of making the man understand the 'why' of putting X quantity of concentrate in a gallon because of safety requirements to himself and his customer, and the controls the resultant emulsifiable is expected to produce."

Other management subjects covered during the week-long conference included "Pricing and Standards" discussed by Purdue associate professor of agricultural economics, W. S. Farris, and "An Analysis of These Principles by a PCO," made by Dr. William K. Deleplane, Illini Pest Control and Service, Champaign, Ill.

A survey was taken to determine the employment opportunities in the pest control industry on the basis of current salaries paid for various positions within companies represented by men attending this conference. Results are to be made available to Pest Control magazine for publication after they have been tabulated. Myron W. Smith, Hill-Smith System, Memphis, Tenn. was responsible for administering this project.

A proposed insured service and repair warranty program, backed by the National Pest Control Association, for corrective termite control work, was discussed in general terms by association secretary, Dr. Ralph E. Heal. Since no definite terms have yet been agreed upon, details of the program were not available for publication at presstime.

Vertebrate Pests

Two-thirds of one conference day was spent on control of vertebrate pests; specifically birds, miscellaneous animals, rats, and mice. Three 80-minute rotating sessions put PCOs in touch with discussion leaders—John Beck, assistant district agent for the Fish & Wildlife Service, Columbus, O.; Arthur W. Gibson; James Steckel; Chester Robinette, Getz Exterminators, St. Louis, Mo.; Jess Stratiff, Akron, O. rodent control expert; Galen C. Oderkirk and William D. Fitzwater, district agent and assistant district agent respectively of the F&WLS headquartered at Purdue; and Charles Knote, Cape Chemical Co., Cape Girardeau, Mo.

A hand survey revealed 70 to 80% of those attending the meeting do some bird control work, but the frequent question voiced by PCOs over flock control in cities was, "Who's going to pay for it?" The administrative entanglements put operators right between local businessmen and city officials who both want something done about the birds, but each expects the other to pay for it.

Thallium and strychnine poi-

soned grain was recommended where lethal baits are permitted to control large flocks of pigeons feeding in rail yards and around feed mills.

For control of starlings on city dumps and farms, use 3% sodium fluoride in a bone meal and meat mixture thrown over the ground area, experts said.

Rat, Mouse Controls

The "best" food mixtures to use with popular rodenticides, according to government rat and mouse control experts, are:

With **anticoagulants**—a mixture of 60% cornmeal, 25% rolled oats, 5% sugar, 5% crude corn or peanut oil, and 5% of the anticoagulant;

With **arsenic** — use in water or mixed with 96 parts of fish;

With **zinc phosphide** — one part poison with 99 parts meat, or sliced or cut up fresh vegetables; and

With **thallium sulphate**—one part thallium to 199 parts fish or meat, or 2% in water.

The addition of 1 part tartar emetic to each of the last three poisons will minimize accidental poisoning of other animals.

Some delegates have increased acceptance of baits by the addition of Durkee's shredded coconut, or by upping the protein content by adding protein mix.

For those places where tracking powders are useful in rat control, the recommendations were for Antu, 2% PMP, or any of the anticoagulants.

And what about using dyes other than black in baits? Black, of course, has to be used with liquid 1080 and sodium fluoroacetate baits. Field experience seems to be that red is a popular dye in other water baits. Some use vegetable dyes, available in most grocery stores; others prefer more stable coloring agents such as G305 Flaming Red Dye available from Ox Color Works, 142 West 42nd St., New Cork City. One operator said his favorite formula was: 2% thallium sulphate in water, plus glacial acetic acid, plus 2 drops of methyl red indicator powder (liquified in a little alcohol) per gallon of the water.

The old-fashioned glue board is apparently still popular for use in places where poison baits cannot be used, and particularly to snag one or two hard-to-get rats or mice.

Animal Rundown

In one lively session, all the delegates in the room acted as members of an open discussion panel to share their experiences with various control measures for

Assisting Dr. John V. Osmun, Purdue's entomology chief, in staging this year's short course, were NPCA executive secretary, Dr. Ralph E. Heal (standing), and conference planning committee chairman, Robert C. Yeager (right), Rose Exterminator Co., Cincinnati.

miscellaneous animals. Here is a brief summary of their recommendations:

Moles — Control them by getting rid of grubs and other turf insects that they feed on through use of 2% chlordane emulsion, or 5 to 8 lbs. dieldrin per acre. Harpoon traps positioned over runways are effective, as is the use of thallium sulphate covered Jumbo or Spanish peanuts.

Chipmunks—Many ideas reported, Thallium coated peanuts, snap traps, sun flower seed treated with zinc phosphide in mineral oil and placed in runways under cover or in burrow openings, a mixture of thallium, zinc phosphide, or strychnine mixed with flour and coated on fruit, get results.

Squirrels—Survey the outside area of a house in which the culprits are romping to see if there aren't limbs of trees they're jumping from or to in their travels. Cutting of these limbs will help solve the problem. Wooden snap traps baited with walnut and apple was suggested for squirrels in attics. The addition of 2 oz. of ground nuts to an anticoagulant bait increases acceptance.

Raccoons — Trapping is probably the best control because coons are "game" animals that are not supposed to be poisoned. Effective repellents mentioned are Chaperone Dog & Cat Repellent (available in pet shops) sprayed in garbage cans, and synthetic oil of mustard seed and lemon grass used in similar places where coons are troublesome.

Bats — One PCO reported success by using a 50% DDT powder in a Breuer blower to blanket a bat-infested attic. Use of Antu dust on roosting places, such as behind large letters in an outdoor display sign, was another reportedly good technique. In unused attics or other large rooms try spraying first with an oil-base lindane followed by using several hundred pounds of paradichlorobenzene crystals to get the bats out and keep them from returning. Be sure to cover up the openings bats have been using as entryways, and remove accumulated guano.

Skunks—Repellents were the preferred method of control and the one suggested was a mixture of 1 tablespoon formaldehyde and 1 lb. PDB crystals that can be scattered under porches and like areas. To remove skunk odors from cats and dogs, one PCO reported success by giving the pets a bath in tomato juice or vinegar and then washing thoroughly with warm water and soap.

Odor Control

But PCOs are called upon to get rid of many other kinds of odors in their work besides those caused by skunks. Elmer R. Jones, Jones Pest Control Co., Owensboro, Ky., has made a study of the causes and controls of odors and reported his findings at one of the Purdue sessions.

The best way, of course, is to remove the source of odor if it can be found. But for relief before that can be done, masking agents are useful. Ones used for decomposing rats are: Magnador No. 41 available from Magnus, Mabee & Reynard Co.; neutroleum alpha produced by Fritzche Brothers; and DB-455 sold by Susan Products Co.

Odors beneath buildings, frequently caused by decaying growth, moisture, or soured vapor barriers, can be corrected by cleaning up the causative problem. Often the installation of foundation ventilators is necessary to keep the underarea air fresh.

Two Clover Mites

Though there may be a slight slowdown in home building because of tight money, clover mite problems are increasingly confronting pest control firms called upon to give relief from this pest that's frequently found in lawns of new housing developments.

Harry Katz, Elco Laboratories, Pittsburgh, Pa., told his fellow pest controllers, "in the literature researchers have frequently confused the brown mite (B. arborea or B. rubrioculus) with the clover mite (B. praetiosa).

"The brown mite is found on fruit trees whereas the clover mite's preference is for low growing herbaceous plants," he said. This confusion has caused the recommendation of many ineffective controls.

Clover mites have a low threshold to cold; 65 degrees is ideal for their life cycle, Katz reported. They have two to five generations a year which always overlap. They eat legumes, lawn grasses, weeds, clovers, ornamental flowers. Well-fertilized plants make rapid population increases possible.

To control nymph-adult stages of the clover mite, Katz recommended Aramite, chlorobenzilate, Diazinon, Dimite, Kelthane, and malathion. For eggs stages, he suggested Genite and Ovatron.

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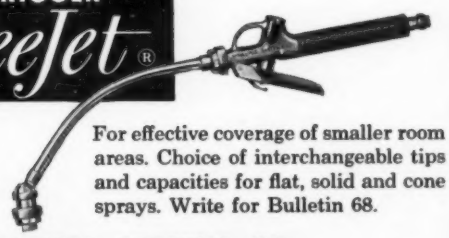

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concentrate per 100 gals. water, except for malathion which should be mixed at the rate of 1 gal. 50% emulsifiable concentrate per 100 gal.

The procedure for applying these chemicals Katz outlined is as follows: Treat lawn around the entire perimeter of the house, for about 20 ft. from its foundation. Spray grass, shrubs, and tree trunks. Grass must be cut before spraying. The dosage to use is about 40 gals. per 1,000 sq. ft. of lawn. Also treat foundation walls, and the wall above the foundation up to window sills. Use additional pressure to drive the solution into crevices. Treat especially thoroughly around basement window casings and frames. Heavy rains immediately after treatment usually reduces control effectiveness, he reported.

Inside houses, use 3% malathion, .5% Diazinon, or .5% pyrethrins, sprayed weekly, or oftener, around window sill crevices, window opening hardware, faults in plaster near the sill, infested baseboards and quarter-rounds, and crevices around the threshold and door. Only the sunny sides of a house need be treated, Katz said.

Be certain to test inside spray formulations for staining possibilities before making general applications. He also suggested giving the customer a household type pyrethrum aerosol for quick momentary relief between service calls.

Ornamental PC Opportunities

Though there are several problems which PCOs must recognize before they get into the control of insects of ornamental plants around offices and yards of customers, the field "offers you and your firm an additional source of customer service and income," Dr. Donald L. Schuder, assistant professor in entomology at Purdue, told delegates.

There are an entirely new group of insect pests involved, and ornamental plants must be learned so they can be recognized. Many insect pests are host specific, hence if the operator knows the host plant, he will be able to identify the insect more easily.

Many of the formulations required for ornamental pest control vary from those used in routine PCO work, even though the toxicants may be the same. And, high volume, power sprayers are required if adequate spraying of large trees and shrubs is to be done. Repeated sprayings throughout the growing season are often necessary and ornamental insect pests can be frequently controlled only at specific times during their life cycle. A thorough knowledge of which plants are sensitive to certain toxicants and formulations is likewise required.

Phytotoxicity is a common hazard.

A general purpose spray, with limited phytotoxicity problems, uses some of the new insecticides, miticides, and fungicides. They can be combined into one spray or used separately for specific pests.

Toxicant and Formulation	Amt. per 100 gals.	Amount per gal.
50% Sevin Wettable Powder, or	2 lbs.	2 tsps.
4 lb./gal. Ethion Emulsifiable concentrate	1 qt.	2 tsps.
18.5% Kelthane Wettable Powder	2 lbs.	2 tsps.
65% Cyprex Wettable Powder	1 lb.	1 tsp.

Dr. Schuder recommended that PCOs interested in going into ornamental pest control work should get in touch with their county and state agricultural agents to obtain their counsel on chemicals to use, common ornamental pests in their area, and the hazards to watch out for.

The complete text of Dr. Schuder's address on shrub and tree insect control will be published in the June issue of Pest Control.

Other simultaneous sessions held during Thursday afternoon included one on chiggers, chaired by Bernard Berger of Able Pest Control Co., Springfield, Ohio, and another on ant control, presented by Robert M. Russell, technical director of Orkin Exterminating Co., Atlanta, Ga.

"How a material is applied is often more important than the choice of material," Dr. John V. Osmun told PCOs in a 15-minute review of currently used insecticides.

Recipient of NPCA scholarship. Robert Fosler (right) of Logansport, Ind., received the annual $200 award made to an outstanding entomology student at Purdue, from the University's dean of agriculture, Dr. Earl L. Butz, during PU's Conference last month.

"Cut a little here, Shave a little there, Whittle a little yonder . . ."

Because both industry and consumer interest in termite control is highest it's ever been, an entire morning of the conference program was given over to termites and control methods.

But throughout the discussions, experts repeatedly warned soil treaters to discontinue the downward spiral in reducing the concentrations of soil toxicants. Outspoken in their criticism of this trend were H. R. Johnston, of the Southern Forest Experiment Station of the U. S. Forest Service, Gulfport, Miss. where the nation's stake tests to evaluate soil poisons are conducted; Dr. John V. Osmun, under whom research on termite development and control at Purdue is conducted; and William L. Butts, instructor in PU's four-year course for PCOs.

"The tendency seems to be to cut a little bit here, shave a little there, and whittle a little yonder. It is dangerous to do this," Johnston cautioned. He said, "At the present, chemical soil treatment ranks high among the measures recommended for the prevention and control of termites . . . (but) . . . there is no guarantee that the good reputation of soil treatment will continue forever.

"Since the chlorinated hydrocarbons were first recommended for the control of termites, there has been a tendency by some manufacturers, formulators, and PCOs to reduce the concentrations of chemicals in order to undersell their competitors and secure business."

Where will the downward trend end? What will be the consequences? Johnston told the group, "Quite conceivably, it could end with inferior treatments and consequently unsatisfactory control. Should this happen, soil chemicals stand to lose much of their good reputation and fall into the disrepute that shields are now in."

Research in the laboratory and in the field has shown that high concentrations and dosages of chemicals are more effective than lower ones, the Forest Service researcher reported.

"The highest recommended concentrations of the chemicals most commonly used are inexpensive compared with the cost of labor for applying them. It would appear to be good business

(Continued on page 62)

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SILVERFISH . . . Identification of types, damage caused, methods and materials of control.

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COCKROACHES . . . Types, sprays, dusts and powders, baits, other methods of control.

CRICKETS . . . Crickets as pests and their control.

EARWIGS . . . History and habits, recognition of damage, control.

TERMITES . . . Different species, food, reproduction, types of damage, control through pesticides, sanitation, structural design.

DECAY FUNGI . . . Recognition of damage, control, treatment of structural timbers.

WOOD BORING, BOOK BORING BEETLES . . . Tabulation of common household and industrial beetles, recognition of infestation, methods of control.

BOOK LICE . . . Description, life history and methods of control.

BEDBUGS . . . Occurrence, types, appearance, control.

CLOTHES MOTHS . . . Food, reproduction, types of damage, prevention of infestation, control.

HIDE AND CARPET BEETLES . . . Types, life history, methods of control.

ANTS . . . Anatomy, castes, control of various types.

BEES AND WASPS . . . Beneficial aspects, types and methods of control.

STORED PRODUCT PESTS . . . Recognizing infestation, pests of dried foods, grains, meat and fruits, methods of preventing infestation and control.

LICE . . . Types, methods of infestation and control.

FLEAS . . . Life history and habits, natural enemies, sanitation and control.

FLIES, GNATS AND MOSQUITOES . . . Habits, effectiveness of insecticides and larvicides, measures of controlling breeding, other control.

SPIDERS . . . Poisonous and beneficial types, methods of preventing infestation and exterminating techniques.

MITES . . . Cheese, grain, animal and plant mites and methods of control.

TICKS . . . Recognition of types, damage and control measures.

MISCELLANEOUS HOUSEHOLD PESTS . . . Earthworms, sow and pill bugs, slugs and snails, centipedes, scorpions, among others, including birds.

The new HANDBOOK OF PEST CONTROL is the latest and most complete book ever published on household and industrial pests and their control. Written in easy-to-understand language by a recognized authority with years of scientific and practical experience. It is technical, yet easily followed by those who may have limited knowledge of science and the chemistry of pesticides. Deals fully with rodents, insects, decay fungi, habits, identification, and latest methods and materials for control. A complete and up-to-the-minute book. Bound in sturdy, handsome gray cloth, gold stamped.

$12.50 in U.S.A. **$13.00 elsewhere**

Check or Money Order Must Accompany Your Order

PEST CONTROL magazine
1900 Euclid Avenue
Cleveland 15, Ohio

$12.50 in U.S.A.
$13.00 elsewhere

Enclosed is our check for $_____ for _____ postage paid copies of **"Handbook of Pest Control."**

Name_____

Company_____

Address_____

City_____ Zone_____ State_____

Rotarian Oliver Goldsmith, president of the firm bearing his name, adheres to the Rotary 4-Way Test of good business spelled out in the plaque that sits on his desk. Two cans in foreground contain O-G Roach Powder mixed and sold by the Goldsmith company.

$20,000 Ad Budget Spent to Develop $325,000 Volume for

OLIVER GOLDSMITH CO.

WACO, TEXAS

By PATRICK J. GALVIN

A SWEEPING direct mail program, and copious use of highway signs at strategic locations have keynoted the growth of the Oliver Goldsmith Co. over vast portions of central, east and west Texas.

The 40-year-old firm with headquarters in Waco has, in the past dozen years, grown from $40,000 annual volume to more than $325,000 largely on the strength of mail and highway advertising, backed up solidly with fast, guaranteed service and strict adherence to a customer-is-always-right policy. Goldsmith now covers a 125-mile radius from the Waco headquarters, accounting for nearly half the gross, and has branches in Dallas, Wichita Falls, Beaumont, Austin, Bryan and Victoria. There are 34 employees in all, with 20 modern service trucks. About 20% of its total work is in pest control; the remainder almost entirely in termite control.

"There used to be a lot of household fumigation business," remarks Goldsmith, "but the new poisons have just about eliminated the need—and all the problems, also. We're thankful we don't have to worry about that type of business any more."

Started Over 30 Years Ago

Goldsmith started in the pest control business when, more than 30 years ago as a plumbing contractor, he noted the widespread need for some sort of control when he inspected piping in homes and other buildings. At that time he figured some sort of control for rats and roaches would furnish good supplementary money for his plumbing business. He went out and bought all the roach poisons he could find, read the labels for ingredients, and started making roach powder under his own label. Since he was not known in the pest control business and had to establish confidence, he charged $5 for a 5-room house with $2.50 down and the remainder after 90 days if his control worked. So even then, 30 years ago, guaranteed satisfaction was his forte.

He moved on then to termite control, following the same method. He bought termite preparations and studied the labels, wrote for government and college pamphlets and papers on termite control, developed poisons and slowly extended his service to all forms of pest control.

Mailing Equipment: $10,000

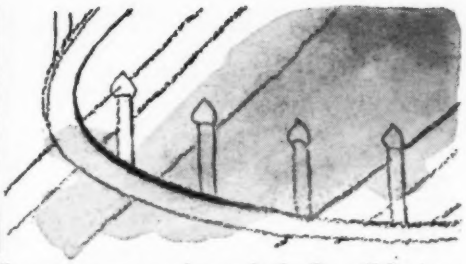
As a plumber he had worked out of his garage. In just a few years his business changed over entirely to pest control, and he had to build a 90-foot extension on his garage. That was his headquarters until six years ago when he bought a good brick residence on a business corner, planning to rent some of it to pay the overhead. But within weeks he saw that he would need all of the room himself, and it still serves as his Waco headquarters.

Inside it, in one room, is the heart of the Oliver Goldsmith direct mail program. Here he has about $10,000 worth of mailing equipment to mechanize the operation, accumulated over several years. Included is a Graphotype machine for stamping his own metal Addressograph plates, a Speedaumat machine for addressing pieces of mail at the rate of 7,000 per hour, and a Pitney Bowes folding machine. He also has a Saxmayer tying machine to bundle the mail, and some 200,000 Addressograph plates just for the mailings from Waco.

Basically, he figures on four business-building mailings per year. These are general, to the entire list or to selected parts of it. But he also sends out a mailing whenever he feels business is starting to lag and needs some stimulus. With his automatic

82 highway signs dot the countryside on heavily traveled routes leading into Goldsmith's service areas. They're all the same, varying only in size. This is the company's trademark and is used on all direct mail and office stationery.

"When we talked about the Plan person-to-person, participation jumped 30%!"



In our company we've made the Payroll Savings Plan available for some time. I thought, naturally, that we had a large participation. But when I checked up a few weeks ago I discovered that only about 22% of our people were making use of the Plan. It's so easy to say, "Sure, this is a fine idea, and I'll sign up next payday."

What our people needed was someone to explain this convenient savings plan *in person;* someone to show them that just signing the card would put this fine thrift program into automatic operation. They needed somebody to invite them to *start right now.*

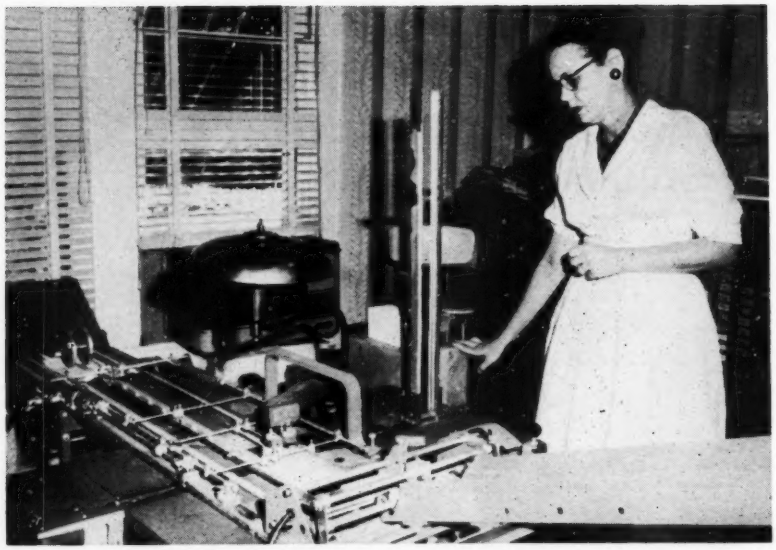
When I contacted our State Savings Bonds Director, he helped us set up a thorough, informative canvass of everybody on our staff. As a result more than 30% additional employees signed up for this easy, systematic way to buy U.S. Savings Bonds, *regularly.*

Perhaps *your* organization, too, has a large percentage of employees who have *never been invited* to combine patriotism with basic thrift through the Payroll Savings Plan. Companies with high employee participation are enthusiastic about its benefits in terms of lower employee turnover, better safety records, and the satisfaction engendered by helping large numbers to contribute to our Nation's Peace Power. The greater your employee participation, the more substantial your company benefits will be. Contact your State Savings Bonds Director for prompt, practical help in spreading Payroll Savings information, *person-to-person.*

NOW! U. S. SAVINGS BONDS EARN 3¾%

PEST CONTROL magazine

THE U. S. GOVERNMENT DOES NOT PAY FOR THIS ADVERTISEMENT. THE TREASURY DEPARTMENT THANKS, FOR THEIR PATRIOTISM, THE ADVERTISING COUNCIL AND THE DONOR ABOVE.



Mailing equipment includes this Addressograph that'll turn out 7,000 pieces per hour, plus over 200,000 Addressograph plates shown in the background. Goldsmith has invested some $10,000 in mailing machines.

equipment, three girls in the office can get out a mailing of 25,000 in a half day.

All material is printed commercially. Routine pieces are a letter welcoming new customers, another letter for mailing before a contract expires offering a renewal at the same terms, a folded business-reply postcard in red, yellow and black asking recipients to "Ask Your Neighbor About Us," and a 50-page, 3½"x 5½" notebook with a "to" postcard as a front cover and a reply postcard as the back cover. The front cover carries some advertising, including a rundown on the termite family on the inside. The reply postcard back cover has blanks for the mailer to tell what his pest problem is and places to check to have a representative call as soon as possible or on his next trip.

Goldsmith uses these small notebooks at neighboring houses. When Goldsmith calls on a prospect he leaves a notebook, especially when the prospect is not in.

Servicemen Are Salesmen

It is exceptionally good for the salesmen, because they get percentage bonuses whenever they sell any leads, or when they provide leads that become sales later. The salesmen, incidentally, are the servicemen. Goldsmith has no salesmen, but he regards every serviceman as a salesman and pays him accordingly. If they sell jobs for which the leads come in by mail or telephone, they get a certain percentage. If they sell "cold turkey" jobs in the neighborhood where they are working, they get a larger percentage. Consequently, they find it valuable to leave the little notebooks at houses where the occupant isn't in.

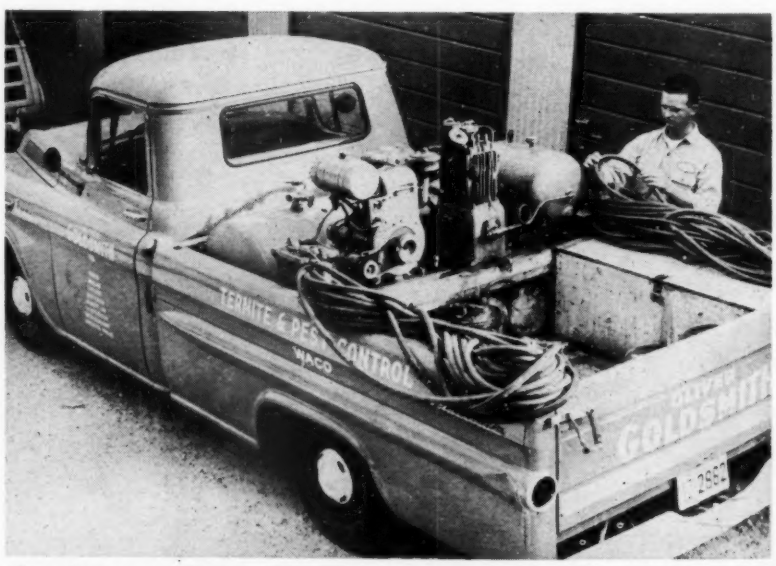
This percentage system replaced the sales contests that Goldsmith tried for years. He found that certain men always won the contests, so he eliminated them in favor of rewards by the job.

On his direct mail program, Goldsmith figures his return averages little more than .5%. That's low, he admits, "but it still is necessary." He reports: "Sometimes the return is so low that I'd abandon the whole thing if I didn't know better. I found out long ago that results can come months or years later, and I feel our growth is due as much to the mailings that didn't bring calls immediately as to those where the immediate returns averaged 3 or 4%. They all have value, and the value shows up in our growth over a period of years."

Signs on Main Highways

Goldsmith's highway signs are scattered all over Texas on main highways, especially those leading in to where he has branches. He has 12 larger signs, measuring 8x12 feet, for the highways leading into Waco and Victoria. He has about 70 smaller signs, 4x8 feet, at the other branches and around the state. They all are the same, showing his trademark with his name and a map of Texas with the branch offices marked and named. This same trademark is on all his direct mail and letterheads.

Other forms of advertising have been tried and still are used. Newspapers are used occasionally, seasonally. Radio spots are used. For a while a one-minute television movie was used, showing a truck driving off to a job and then the job in process, or in other cases showing the proper use of the Oliver Goldsmith roach powder squeeze bottle. Goldsmith found television a bit too expensive in that form,



All servicemen are uniformed, both on-the-job and while they're selling. Goldsmith believes in keeping his men and his equipment neat in appearance. Here is one of 20 modern service trucks used for termite work.

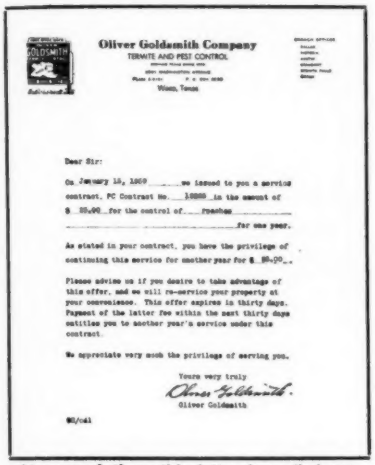
Oliver Goldsmith Company
TERMITE AND PEST CONTROL
Waco, Texas

May we take this opportunity to welcome you as a customer. We strive at all times to render the best termite and pest control service possible.

If you have an inquiry or if we may be of further service to you at any time, please do not hesitate to call on us. We appreciate very much the privilege of serving you.

Yours very truly,
Oliver Goldsmith
OLIVER GOLDSMITH

Welcomes new customers with this brief note.



Oliver Goldsmith Company
TERMITE AND PEST CONTROL
Waco, Texas

Dear Sir:

On January 15, 1959 we issued to you a service contract, PC Contract No. 10888 in the amount of $ 35.00 for the control of Fleas for one year.

As stated in your contract, you have the privilege of continuing this service for another year for $ 35.00.

Please advise us if you desire to take advantage of this offer, and we will re-service your property at your convenience. This offer expires in thirty days. Payment of the latter fee within the next thirty days entitles you to another year's service under this contract.

We appreciate very much the privilege of serving you.

Yours very truly
Oliver Goldsmith
Oliver Goldsmith

GG/cal

At renewal time, this letter is mailed out

and later changed to simple identification spots which he still uses.

His advertising budget overall runs about $20,000 per year.

All of this must be backed up by cheerful, constructive service, according to Goldsmith. He says, "it isn't enough to make something right when a complaint comes in—and sometimes they do come in. We feel we must do it cheerfully, with the same spirit as when we first do the job. Our attitude is that we really appreciate knowing about any failure, because we must do the job right.

"I'm a Rotarian, and I have always felt that following the Rotary 4-way test is good business. That test is 'Is it the truth? Is it fair to all concerned? Will it build goodwill and better friendships? Will it be beneficial to all concerned?' That adds up to a sort of golden rule for doing business. We have followed it all the way, and is has kept us on the right track."

First Arizona PCO Course

(from page 30)

on "Poisonous Arthropods and Their Control."

Concurrent sessions on insect recognition, life histories, and control procedures opened the day. Topics were handled by Arizona U. staff members, L. A. Carruth, G. D. Butler, W. L. Nutting, K. W. Radford, J. N. Roney, F. G. Werner and others, plus Norman Ehmann and Prof. Davis.

The annual election of officers for the Structural Pest Control Association of Arizona was held during the two-day conference at a special breakfast Saturday morning. New president is Matthew Van Stelle, Matt's Pest Control, Tucson. Stuart R. Lyon, Lyon Pest Control, Phoenix, was picked for vice-president, Hector Maciet, Security Pest Control, Tucson, secretary, and new treasurer is William Hodder, Arizona Chemical Service, Tucson. These officers, and immediate past president John J. Dwyer, Orkin Exterminating Co., Phoenix, make up the Board of Directors.

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★ PENTACHLOROPHENOL

AFC "Your House of Powders" has always featured the newest developments in control chemicals and a complete quality line of sure-kill, safe, long-lasting, economical insecticides for highly profitable termite, cockroach and mosquito work.

Now . . . AFC is official distributor of Davison Dri-Die® . . . the new, odorless, non-toxic, silica gel powder that kills and controls on all surfaces—economically! Especially recommended for roach, dry wood termite and flea infestations . . . it is effective in doses as low as 8 to 16 ounces per 1000 sq. ft.

P.C.O.'s look to AFC for proven best insecticides—Write today for full details on all of our chemical formulations.

AFC

AMERICAN FLUORIDE CORP.
415 Lexington Avenue
New York 17, New York

Mammouth wings of Todd Shipyards floating drydocks in Houston, Texas made tarping job tough for California termite firm hired to fumigate the structures to eliminate serious termite infestation.

Admiral Successfully Fumigates *Floating* Drydocks for Termites

When the Admiral Pest Control Co. of Bellflower, Calif. undertook to eliminate the foreign termite Coptotermes Crassus at Todd Shipyards in Houston, Texas, it tackled a unique operation. Never before in tarp fumigating history had a floating object or wooden pier been fumigated under tarps using water as a bottom seal.

The complicated operation, supervised by Admiral's owner, Walter D. Lance, not only involved removing the infestation from seven floating drydocks, two wooden piers, and a drawbridge. Admiral also had to fight a hurricane at the same time. Before Hurricane Debra had passed, $3,500 worth of equipment had been lost, as were two partially tarped 88 foot sections of dry docks which had floated about a mile down the channel before finally being grounded.

Naturally, being the first time for an operation of this kind, Admiral had many unusual problems before the operation was completed.

Labor was a major problem for Mr. Lance in the beginning. Because of the hot humid climate in Houston, the regular crew returned to California after working two weeks. Green labor had to be hired to complete the job.

A large gantry crane operated on the pier all day, which annoyed and handicapped operations.

How to anchor the 16,000 sq. yds. of Fiberthin (U. S. Rubber Company's coated nylon tarping material) to the 720 and 640 feet long floating docks so that the tarp would still extend into the water, was another major problem. This was accomplished through several procedures. After putting two 1"x4" boards in the tarp and nailing through them and the tarp to the wooden dry docks, the next step was to lower another tarp over the top 46 feet of the empty ship berth, and let it hang to the water. While the top of the tarp was held, the bottom edge was nailed to the dry dock from the boat.

To prevent the wind from getting under the tarp and making a sail, 50 pound weights were tied to each corner before it was lowered. Short lengths of chain were tied to the bottom edge of the tarp to prevent the methyl bromide from escaping. The varying tide and waves caused by ships entering and leaving the harbor would otherwise break the water-tarp "seal."

The Visqueen sheets were joined together by rolling and clamping the roll between two wooden laths with 2" metal "C" clamps.

Being on the Houston channel, the wind blew much of the time so Lance had to decide how to prevent deck tarps from billowing and flopping. This was solved by soaking the tarp with a fire hose. An occasional rain also helped.

Fumigation Technique Employed

Assisted by methyl bromide heat exchangers, 20,700 pounds of the gas were passed through ¾ inch heavy duty rubber hose into the drydocks. To insure proper circulation, electric fans were placed in the lower sections of the wing walls and could be turned on and off outside the fumigated area to move heavy concentrations from the lower sections to the top of the wing.

Testing for Concentration

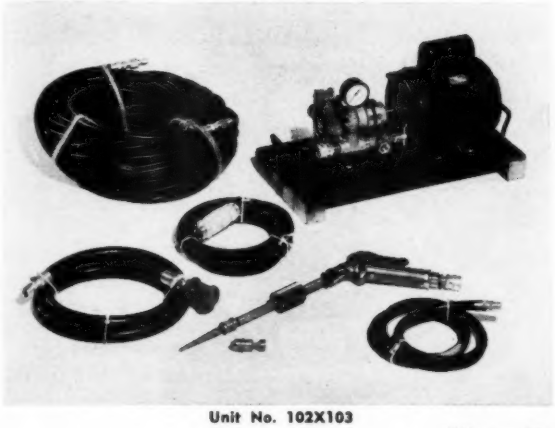
To test the concentration of methyl bromide in the fumigated area, several miles of ¼ inch polyethene tubing was placed by fumigation expert L. J. Padgett of the U. S. Department of Agriculture and his crew, in many areas of the dry docks before

Many of the water-soaked timbers were so badly riddled with Coptotermes Crassus, wood had to be replaced once termites were killed.

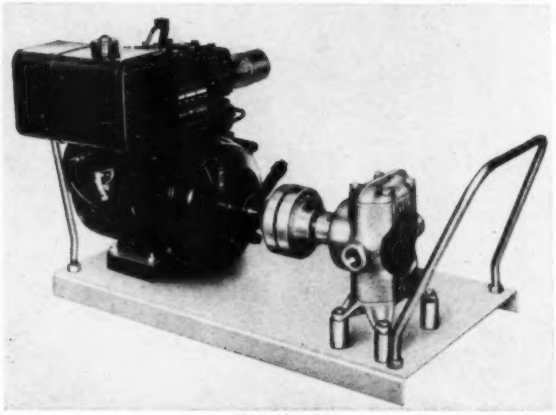
NEW for T & PCO

Here's the Equipment that Helps You Get MORE BUSINESS

Efficiently! Economically!



Unit No. 102X103



Unit No. 211

New Pump Units

#102 and #103 SMALL TWIN PISTON PUMPS — **#211 BIG-TWIN PISTON PUMP**

for

Pest Control — **Pre-Treating**
Termite Control — **Orchard Spraying**
Weed Control — **Tree Spraying**

(See Table at right for Capacity and Pressure)

Unit H.P.		102 ½ Elec. Mtr.	103 1 Elec. Mtr.	211 5¾ Gas Engine	
Speed		1725	1725	500	
Pressure		100	200	300 - 400	
GPM	Unit 102	1.98	1.92	1.85	1.78
"	" 103	3.07	2.95	2.88	2.80
"	" 211	9.00	8.97	9.94	8.90

•

Engineered with your needs in mind.
High Pressure Up to 400 lbs. per sq. inch.
All-Around Use Handles a wide range of both suspensions and solutions, wettable powders, chemicals, insecticides, oils and water.

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- __ Rechargeable Lights
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- __ Masonry Core Bits
- __ Masonry Hammer Bits
- __ Compressors
- __ Air Hammers & Tools

Pump Unit #_____ Or GPM_____ PSI_____

To be used for_____water, or_____oil solutions

Remarks_____

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Name_____

Firm_____

Address_____

City_____ Zone_____ State_____

fumigation. Running the tubing to a station on land enabled Fumiscope gas analyzer readings to be made safely and effectively at regular intervals throughout the 48 hour exposure period. Such readings are necessary to be sure the proper concentration of gas is maintained at all points within the fumigated area.

In the beginning, the infestation of Coptotermes Crassus was very heavy in many of the dry docks. There was particularly heavy damage to the large timbers, many of which had to be replaced. After fumigation, eight weeks and 5,000 man hours from the time the operation started, some of the remaining large timbers were opened. No live infestation could be found. The operation was a success.

Purdue Termite Talks

(from page 54)

to use at least the concentrations and dosages recommended (and preferably more) of the best chemicals, and apply them carefully and thoroughly. A genuine effort should be made to give the customer really long-term control by increasing the concentrations of the chemicals.

"To do so should enchance the reputation of soil treatments and the pest control industry and make satisfied customers — the best advertising a business can have."

Many termite operators at the meeting said they felt the concentrations recommended by the Minimum Property Standards of the Federal Housing Administration are too low. This was born out in a test problem, conducted by Robert Yeager of Cincinnati, that asked delegates to estimate how much chemical they would use to treat three types of foundations pictured in their manuals. A vast majority of the delegates figured on using more than the FHA-MPS recommended dosages, according to answers turned in.

Bill Butts, who is conducting toxicity tests against termites at Purdue, showed a table which revealed the effect reducing chemical dosages has on mortality results. The threshold of difference between effective control and no control, when concentrations are only slightly reduced, is very small.

"We may be close to the 'all or nothing' line if we decrease dosages of termite chemicals much more," Butts cautioned. "Our work shows the difference between LD-50 and LD-90 is very small; it's even smaller between LD-90 and 'nothing'."

He also told conferees not to directly transfer laboratory findings on the effectiveness of termite toxicants to the field. The data is often misinterpreted, he said. "LD values are only reports of control tests on laboratory colonies and cannot be related directly to field expectations."

And, when interpreting lab results, "field factors" must always be taken into consideration. They usually require that dosages be increased over laboratory findings to give long-lasting residual control of termites, he reminded TOs.

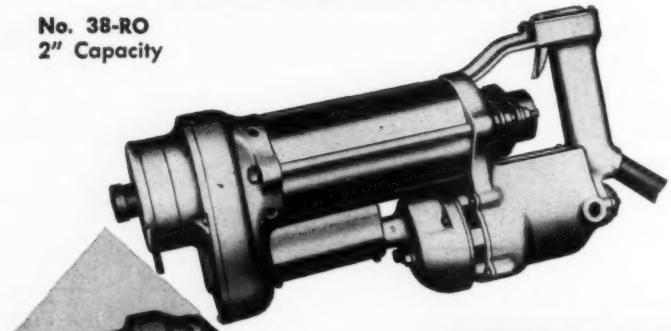
Treated Lumber, Shields

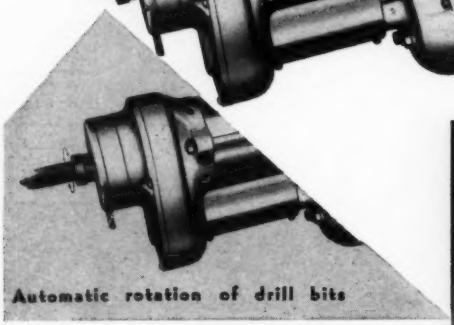
Johnston suggested termite controllers should do more to get their customers to help minimize the chances of termite infestations. Owners and builders should be advised to be sure stumps, roots, paper and other debris are

For faster, cleaner drilling use

- **versatile**
- **dependable**
- **low maintenance**

No. 38-RO
2" Capacity





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ELECTRIC HAMMER DRILLS

— the hammer that takes all the work out of drilling holes in concrete or masonry. Saves you time and money drilling holes.

SYNTRON'S exclusive automatic bit rotation eliminates tiresome quarter turning of drill bits by hand. No need to squat or kneel for floor drilling—drill with one hand.

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Available in models from 5/8" to 2" capacities.

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New

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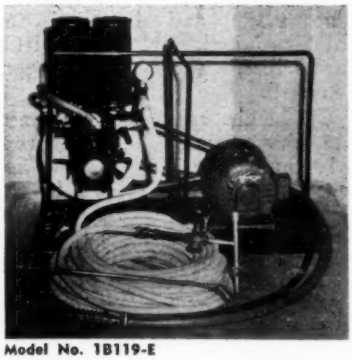
Termite Treating and Spraying Equipment



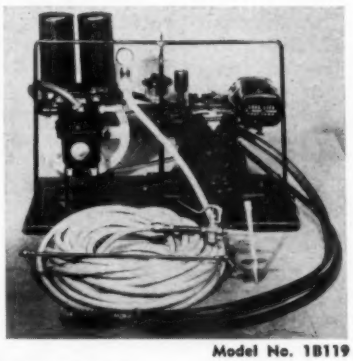
Model No. 1B119-E

OUR BEST PRESHUR-MITE PORTABLES

New improved pressure equalizer tank and floating ball pressure regulator valve smooths out the operation of the pump. Both sprayers are equipped with our famous Diaphragm Pump which eliminates costly pump failure delays. Oil or water base, wettable powders, abrasive or corrosive solutions do not harm this pump. In fact, pump will pump a thin solution of mud without damaging pump. An extra kit of pumping parts comes with each sprayer; can be easily installed by operator in a few minutes on the job; all that's needed is an 8" Crescent wrench.

Model No. 1B119-E (left) is **electric** powered by heavy-duty ½ HP, 60 cycle, single phase 100 volt, repulsion start-induction motor. Pressure easily adjusted from 0 up to 175 lbs. per sq. inch. Capacity up to 6 gal. per minute. Weight approx. 156 lbs. Height 24"; length 32"; width 16". Comes fully equipped.

Model No. 1B119 (right) same as electric-powered model, except is powered by heavy duty 2½ HP, 4 cycle, air-cooled **gasoline** engine. Weight approx. 144 lbs.



Model No. 1B119

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1/8" thru 1/4"*	1.33	1.00	3.33	1.50
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3/8"*	1.53	1.10	4.40	1.60
7/16"	1.73	1.15	4.54	1.65
1/2"	2.00	1.25	4.67	1.75
5/8"	2.40	1.50	5.34	2.00
3/4"	3.07	2.00	5.54	2.50
7/8"	3.74	2.25	5.67	2.75
1"	5.34	2.50	6.67	3.00
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removed from building sites. Adequate drainage must be provided. Good construction design provides ample clearance between the soil and woodwork, proper ventilation, and foundations impervious to the wood-eaters.

Additional protection can be obtained by use of pressure-treated foundation timbers. Sole plates, headers, sills, and joists of buildings can be protected if they are made of treated wood. "Not only is the treated lumber protected from termites, it is protected from decay also . . . and gives long-term protection."

Will termites tube-over treated wood? No one will deny that there are many instances where this has happened. But the extent to which they will do this has not been determined. Studies are now underway at Gulfport to get this information.

"Metal shields properly made and properly installed are highly effective in preventing termite entry into buildings," Johnston said, but he forcefully emphasized the word "properly." Experience has shown that shields usually are installed in buildings in a haphazard manner, he said.

"Twenty years ago shields were highly recommended. Today, they are suggested for use with much reluctance, because they have fallen into disrepute. This is a direct result of misuse. More often than not, the people who made and installed the shields failed, not the shields themselves," the Federal expert reported.

Chemicals as soil treatments, like shields, must be used properly, but their effectiveness has been amply proved both in the laboratory and in the field, he said. Those which have remained 100% effective for 10 years or more at Gulfport are: .5% aldrin; .8% benzene hexachloride; 1% chlordane; and .5% dieldrin. All are applied either as a water emulsion or an oil solution.

Effect of Temperature, Moisture On Soil Poisons

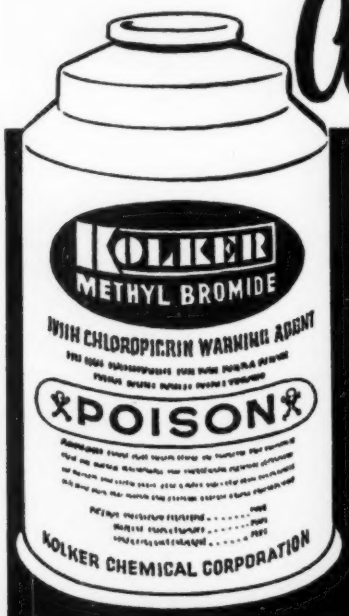
Would the effectiveness of soil poisoning chemicals being tested at the Forest Service's Gulfport, Miss. laboratories be different in other areas of the country where there is a greater range of temperature changes than at the Gulfport test plots? What happens to such poisons when temperatures drop to 20 degrees below zero? Would increased or decreased rainfall (Gulfport has 60 inches annually) have any effect on the performance of these chemicals? These were questions delegates asked of the researchers.

"I doubt that temperature changes would have any effect on results, but rainfall possibly could," Johnston answered. "In the Canal Zone where there is well over 100 inches of rainfall each year in our test area, it takes almost twice as much insecticide to give us the same results we get in Mississippi. Rainfall may have a bearing on this," he admitted.

Wood Treating's Ira Hatfield spoke up and revealed that when he was making stake tests to measure the protection pesticides give against termites, he obtained almost the same effectiveness in test plots located in Virginia, Mississippi, and Florida, where there were different soil types, different temperatures, and different rates of annual rainfall.

A survey of equipment favored by termite operators at the conference was taken, and the results will be published in a future issue of PC after they have been tabulated.

Announcing



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- Does not leave any residual odors, tastes or stains.
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Kolker Methyl Bromide is packaged in regular one-pound cans with 2% chloropicrin as warning agent, and 125, 150 and 450 pound cylinders of 100% methyl bromide.

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Speakers on termites and their control had sobering advice to give PCOs about the use of reduced dosages of soil poisoning chemicals. Shown here, before their part of the program began, are (left to right) Harry Katz, Elco Manufacturing Co., Pittsburgh, Pa.; Jack Bready, Purdue graduate student; Dr. H. R. Johnston, in charge Gulfport, Miss., laboratories of USDA's Forest Service; and Dr. Anders E. Lund, from Verona, Pa., research laboratories, Koppers Co.

Termites and Soil Fumigants

One delegate asked Johnston how he felt about ethylene dibromide formulations being used as a soil fumigant for subterranean termite control in California. There are no laboratory results to report, Johnston said, because no tests have been run on it.

A Californian spoke up and said that his firm has used EDB successfully in the southern part of his state for approximately four years. Recently he has added lindane to the soil fumigant to give both immediate kill and residual control.

Purdue's Bill Butz commented on the addition of other chemicals to EDB.

"One thing to remember is that when you use a fumigant with one of these proprietary chemicals, the 'reach' that you get is from the fumigant alone. You can't get the chlordane or lindane, etc. to go as far as the fumigant does to get that initial toxicity.

"Preliminary testing here at Purdue has indicated that it may be true that the initial toxicity of standard-dosage residuals is going to be high enough in the areas you can actually reach with them, that the addition of a fumigant may be superfluous," Butz reported.

Joe Kahn, now of Vogel-Ritt in Philadelphia, did his research work at Purdue on the use of EDB in soil. Dr. Osmun explained that Kahn's findings show that while EDB is said to be successful under some California soil conditions where the fumigant can readily move through soil, by and large in the Midwest area the soils will not accept EDB or other fumigants particularly well. "The movement in these soils is minimized because of the soil texture, moisture, and its compactness. That means, that in this Midwestern area, except in unusual situations where there is a particular spot down under the slab where you know the fumigant is and where it will not come up into the house, etc., fumigants alone, such as EDB or even in combinations with chlorinated hydrocarbons, have not been unusually successful," Dr Osmun said.

Are Fungi Termite Toxicants?

Dr. Anders E. Lund, research specialist for Koppers Co. at their Verona, Pa. Research Center, reviewed his findings relative to the association between subterranean termites and wood-destroying fungi, some of which were included in his PC article last month (pg. 26).

Recent explorations have uncovered the fact that a number of unidentified wood-destroying fungi might be antagonistic to subterranean termites in a natural environment. Thus, "if the termites were to encounter wood infected by an antagonistic fungus, the insects might actually be repelled by the decaying organism and the wood would remain free from termite degradation," Dr. Lund explained.

Further research is underway to isolate the causative factors which bring about this antagonism so that they might be synthesized and used for termite control materials. The fungus "Lentinus lepideus" appears to have just such a definite negative influence on termites.

Nutrition studies on subterranean termites are being carried on by Purdue graduate student, John K. Bready, of Philadelphia, Pa., who is preparing for his PhD degree through work on this significant subject which has a direct bearing on the future of termite control.

"No previous research has taken into account the micro-organism factor in termites," Bready said. His research is attempting to eliminate such micro-organisms so that the influence of various nutrients on a termite's development may be properly evaluated. At the moment difficulties are being encountered in removing the protozoa from the termite gut in order to begin tests with nutrients that will not be influenced by such protozoa.

Beginners' Day

As in the previous 22 years, newcomers to the Purdue conference were given an entire day devoted to basic entomology and the fundamentals of insect control and damage recognition.

Purdue entomology department staff members digested a four-year course into a few hours for first-year delegates. In charge of these important sessions were David L. Matthew, extension entomologist; Dr. B. E. Montgomery, Leland Chandler, R. C. Dobson, Dr. Howard O. Deay, C. E. McCoy, John K. Bready, and department head, Dr. John V. Osmun.

It was announced that Purdue's 25th Annual PCO Conference will be held January 23-27, 1961, and that the Silver Anniversary "Pest of the Year" will be cockroaches.

NYPCA & PEA Sponsor Roach Control Clinic

An evening clinic devoted to roach control was jointly sponsored by the New York Pest Control Association and the Professional Exterminators Association at the Gotham Hotel in New York City, February 10.

Featured speakers were Dr. John B. Schmitt, entomology professor at Rutgers University; Dr. E. J. Hansens, Rutgers research specialist in entomology; Dr. Ralph E. Heal, NPCA executive secretary; and John K. Medoff, Hudson Exterminating Co., West New York, N. J. Jack Benmosche, Pest Control Equipment Co., Mount Vernon, N. Y., was chairman of the clinic.

Utah Starlings Not Protected

Under the Utah fish and game law, the starling is classed as a predacious bird and may be controlled or killed at any time.

What's NEWS In The Industry

SC PCA Seeks Legislation; Elects 1960 Officers

The South Carolina Pest Control Association voted, at its January 29-30 annual meeting, to seek legislation which would regulate the pest control industry on a state-wide basis.

During the discussion of the proposed bill to be submitted to the State Legislature, it was pointed out that some individual county bills were passed last year and that there is a need for uniformity.

F. Reeves Gressett, Jr., Gressett Pest Control Co., Orangeburg, was elected president of the state association for 1960. He succeeds E. M. Delk of Charleston. Other new officers are Donald Sims of Greenville, vice president; Don Proffitt of Spartanburg, secretary-treasurer, and Tom Knox of Columbia and George Mathews of Columbia, directors.

Ind. PCA Picks Cochnower

H. J. Cochnower of Cochnower's Chemical Service & Pest Control Co., Lafayette, was made president of the Indiana Pest Control Assn. at its annual meeting Feb. 1 held in Purdue University's Adult Education Center. Chosen to serve with him as vice-president, is Walter S. Gibson, Extermital Termite Service, West Lafayette. Prof. J. J. Davis begins his fourth term as secretary-treasurer.

New director is Elmer Dowden, Dowden Termite Control Service, Indianapolis,

Guest speakers at the meeting were Dr. Ralph E. Heal, NPCA executive secretary, Dr. John V. Osmun, entomology chief at Purdue, and William E. Hazeltine, Purdue extension man serving PCOs in Indiana.

Max Carasso Joins Harder

Max Carasso, 30-year employee of Abalene Pest Control Service, Inc., has joined Harder Extermination Service, Inc., of Hempstead, N. Y., as general manager. The move of Abalene's main office from downtown New York City to Albany, N. Y. induced Carasso to accept an offer of the Harder company.

Kans. Outlaws Home Vaporizers

A regulation has been issued by the Kansas State Board of Health prohibiting the sale of continuous or nearly continuous vaporizers for household use. The law says, in part:

"No person, corporate or natural, shall advertise or label any device, intended for household use which is designed and intended to vaporize by heat any chlorinated hydrocarbon insecticide, in such a manner as to suggest, imply, or recommend that the device is to be used while any person occupies the premises where such use takes place, nor shall any person advertise or label such device so as to suggest, imply, or recommend that it be used in living quarters for any period in excess of 8 hours or more frequently than at 14 day intervals . . . "

Court Cuts Fine in Nolen vs. Orkin Case From $90,000 to $3,341.63

Only a jury, and not a judge, may assess punitive damages, the Florida District Court of Appeal held in a ruling which wiped out a $90,019 fine against the Orkin Exterminating Co. (PC, Feb. '59, pg. 52) for enticing employees away from Truly Nolen, Inc. of Miami, Fla.

The Appeal Court's decision, handed down January 26, 1960, said, " . . . our review of the record reveals sufficient evidence of economic piracy to support the conclusion of the chancellor that the defendants engaged in such activity. There is evidence that Orkin set out on an economic campaign, which was to some extent successful, to put the plaintiff out of business."

Orkin appealed the original decree awarded by Circuit Judge Pat Cannon which enjoined Orkin from further interference with Nolen's employment contracts and contained a judgment for Truly Nolen against Orkin for $7,518.01 actual damages and $75,000.00 as punitive damages. A judgment of $7,500.00 as punitive damages against a defendant, Taft Pierce, former Nolen employee who joined Orkin, was also entered.

The appellate court erased Judge Cannon's punitive damage awards and reduced his $7,518.01 compensatory damage to $3,341.63.

Truly Nolen advises PC that he will appeal the decision to eliminate the punitive damages.

Officers and directors of PCA of South Florida at recent installation banquet. (Standing, left to right) directors Samuel Gross, Miami Beach Beach Pest Control; Charles Stewart, Stewart Pest Control; Riley Prince, Riley Prince Exterminators; president, William Conroy, Truly Nolen Exterminators; director Earl Whitford, Able Enterprises, Inc.; guest Dick Lewis, president of the Florida Pest Control Assn.; and director and secretary, Stanley Drevitson, Busy Bee Exterminators. (Seated, left to right) guest Jerome Toffler, secretary of the Florida Structural Pest Control Commission; first vice-president, Henry Petri, Petri's Positive Pest Control; second vice-president, Alvin Burger, Eveready Exterminators; director, Eugene L. Solomon, Bay Exterminators; and director and treasurer, William Levine, All State Exterminating Co. New director Tom Lear, Lear Pest Control, was not present. Each officer and director is a member of a firm operating in the greater Miami area.

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Model B-1 — 32 oz. unit, steel container $10.50 ea.
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Model D-1 — 16 oz. unit, copper container $7.95 ea.

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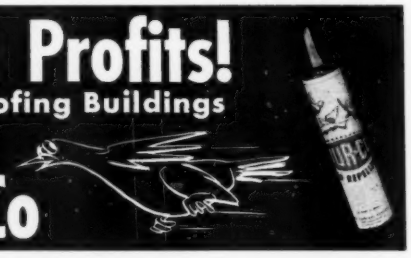

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Bur-Co is a chemical bird repellent, guaranteed to keep birds away from ANY building, when used according to instructions. Eliminates unsightly — and damaging — bird droppings. Non-harmful to humans or birds. Does not damage buildings . . . replaces expensive, hard to install mechanical devices.

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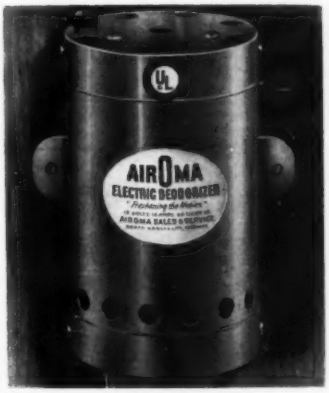

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Bender Is D.C. Prexy

At a recent meeting of the Washington, D. C. Pest Control Association, officers for 1960 were elected. They are: president — Alva H. Bender, Bender Termite Control; vice-president — Samuel G. Durham, J. E. Gaskins Co.; and secretary-treasurer—William E. Roll, American Disinfectant Co.

Members of the board of directors are: J. Robert Byrne, Apex Exterminating Co.; Lou Kelley, Hygienic Sanitation Co.; Herb Meyer, Theodore Meyer, Inc.; and retiring president, Theodore Godeck, Capitol Chemical Co.

Primer

By Any Other Name: Three

One sure way to establish your customers' confidence in you as "someone who knows what he is doing," includes, other than satisfactory performance, the ability to talk about your work intelligently. Using the proper terminology is one of the most effective ways to do this.

To help you take inventory of your knowledge of the technical names for insects you cope with, here is another matching list for you to re-arrange in the proper order so the technical name and the one you're most used to are side by side. Although some may appear relatively easy to old-timers, we're willing to wager they'll miss a few. Newcomers to the profession won't find this puzzler so easy. These selections are taken from a list of common names approved by the Entomological Society of America.

Match-up the numbers with the letters.

1. *Stegobium paniceum*
2. *Trogoderma granarium*
3. *Tinea pellionella*
4. *Blatta orientalis*
5. *Solenopsis geminata*
6. *Sitophilus granarius*
7. *Sitophilus oryza*
8. *Tetramorium caespitum*
9. *Anagasta kuhniella*
10. *Monomorium pharaonis*
11. *Aedes sollicitans*
12. *Xenopsylla cheopis*

__A. Casemaking clothes moth
__B. Drug-store beetle
__C. Fire ant
__D. Granary weevil
__E. Khapra beetle
__F. Mediterranean flour moth
__G. Oriental rat flea
__H. Oriental cockroach
__I. Pavement ant
__J. Pharaoh ant
__K. Rice weevil
__L. Salt-marsh mosquito

Answers on page 72

Alco Fly Cake contains a fly attractant and DDVP and is said to provide "fast, economical, long-lasting, general fly control over large areas." It comes in solid "cake" form and in both granulated and liquid forms. "Shaped like a small donut, the solid Fly Cake may be put into action simply by placing it anywhere flies are a problem," the company claims. For full details, write Alco Chemical Co., 19027 Pioneer Blvd., Artesia, Calif.

MGK Has Strobane

An announcement from McLaughlin Gormley King Co., 1715 Fifth St., S. E., Minneapolis, 14, Minn., reveals it has been appointed by Heyden Newport as a sales outlet for 80% strobane solutions designed for non-agricultural uses.

MGK also offers Strobane in combination with pyrethrins and synergist, both MGK 264 and Piperonyl Butoxide.

Full details and prices are available from this pesticide supplier in Minneapolis.

PCA of S. Fla. Completes 10 Week PCO Course

A ten-week course for PCOs and their service personnel, sponsored by the Pest Control Association of South Florida, was completed on February 2nd.

Said to be the first of its kind, the course was conducted by Eugene L. Solomon, an entomology graduate from the University of Florida, associated with Bay Exterminators of Miami. Approximately 95 persons were enrolled in the lecture and demonstration series.

The sessions were divided into specific areas of interest including: entomology, chemistry, household insect and rodent control, legislation, safety, wood destroying organisms, fumigation, customer relations, and sanitation. Throughout the Tuesday night series, guest speakers brought authoritative information to the students.

It is anticipated similar courses will be given several times annually.

For additional information, write the Secretary of the PCA of S. Fla., 13224 West Dixie Highway, North Miami 61, Florida.

Calendar

Western Div. Penna Pest Control Assn. Monthly Meeting, Webster Hall Hotel, Pittsburgh, Mar. 10, 6:30 p.m.

Central Mid-West PCO Conference, Towne House Hotel, Kansas City, Kans., Mar. 14-15, 9 a.m.

Alabama PCO Licensing Exam., 1308 1st Ave., N. Birmingham; Courthouse, Gadsden; A.P.I. Ornamental Hort. Field Sta., Mobile; 882 State Office Bldg., Montgomery; Courthouse, Decatur, Mar. 15, 8:30 a.m.

New Jersey Pest Control Assn. Monthly Meeting, Entomology Bldg., Rutgers University, New Brunswick, Mar. 16, 8 p.m.

N. J. Mosquito Extermination Assn. Convention, Chalfonte - Haddon Hall, Atlantic City, Mar. 16-18.

16th Annual American Mosquito Assn. Meeting, Hotel Somerset, Boston, Mass., Mar. 27-30.

PCA of South Florida Monthly Meeting, Lindsey Hopkins Vocational School, Miami, Mar. 28, 8 p.m.

Oklahoma PCO Licensing Exam, Capitol Bldg., Room 122, Oklahoma City, Apr. 7.

Eastern Div. Penna. Pest Control Assn. Monthly Meeting, Sylvania Hotel, Philadelphia, Apr. 14, 8 p.m.

Florida Anti-Mosquito Assn. Convention, Hillsboro Hotel, Tampa, Apr. 24-27.

Arkansas PCO Licensing Exam, Department of Entomology, College of Agriculture, Fayetteville, May 2, 1 p.m.

Chemical Specialties Manufacturers Assn. 46th Mid - Year Meeting, Drake Hotel, Chicago, May 16-18.

National Sanitary Supply Assn. 37th Annual Convention, Fontainebleau Hotel, Miami Beach, Fla., May 22-25.

64th Annual Technical Conference & Trade Show of Assn. of Operative Millers, Sheraton-Jefferson Hotel, St. Louis, Mo., May 23-26, 11 a.m.

Insect and Rodent Control Training Course No. 221, Communicable Disease Center, Atlanta, Ga., June 6-17.

Tri-State Meeting for PCOs in Georgia, North and South Carolina, Myrtle Beach, S. Caro., Aug. 4-6.

National Pest Control Assn. 27th Annual Convention and Trade Show, Mayo Hotel, Tulsa, Okla., Oct. 16-20.

Texas Pest Control Assn. Annual Convention, The Gunter Hotel, San Antonio, Nov. 30-Dec. 1-3.

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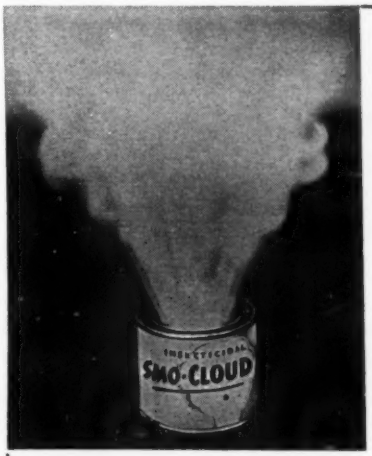

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PC

Infestation Report

Contains pertinent portions of the Department of Agriculture's Cooperative Economic Insect Report, material from university entomology departments and reports from readers. PCOs noticing infestations in their own areas are urged to communicate with Pest Control so their information may be added to this infestation report.

IMPORTED FIRE ANT
(Solenopsis saevissima richteri)

Louisiana: Infestation reported in Allen Parish for the first time. This new parish record brings to 49 the number of parishes found infested.

CLOVER MITE
(Bryobia praetiosa)

North Carolina: Invading homes in Wake County.

GERMAN COCKROACH
(Blattella germanica)

North Carolina: The worst infestation ever observed in private residences by entomologists with the State Health Department was found in a Federal housing project in Lenoir County. Large patches of immatures were found under calendars and a considerable number of adults were taken from a sink where a housewife was washing collards. A nearby storekeeper complained about large numbers of these cockroaches being returned in empty bottle cartons from the residences.

FACE FLY
(Musca autumnalis)

Virginia: Adults of this species, along with adults of Pollenia rudis, are present in some homes in Highland County. Investigation of two complaints by homeowners revealed that M. autumnalis adults were equal to or exceeded P. rudis in number.

INDIAN MEAL MOTH
(Plodia interpunctella)

Oklahoma: Numerous reports of this species being especially numerous in homes in Stillwater, Perry, and Woodward areas.

KHAPRA BEETLE
(Trogodemra granarium)

California: Three new infestations reported from Imperial County, involving two farm properties and one feed lot. One mill in Brawley, Imperial County, and one feed lot in Borrego, San Diego County, have been fumigated. Arrangements to fumigate the four remaining known infestations are underway.

RATS

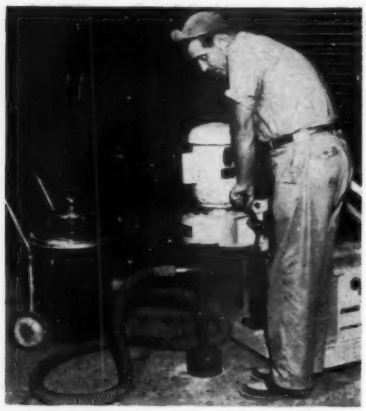
Colorado: Rats have become a serious problem in Wasatch County. Recent population increases of both wharf and field rats have been noted in Heber City business district, and in the Heber-Midway dump yard.

A TERMITE

Ohio: Pellets of what were thought to be those of a dry-wood termite, probably Cryptotermes sp., were found under an inside door of a residence in Akron. An attempt is being made to secure specimens for specific determination.

SUBTERRANEAN TERMITES

Utah: Quite a number of Salt Lake County homeowners have reported damage in recent weeks.



"Dustless Drilling" is the claim made by New England Carbide Tool Co. for its new "Method A" which incorporates its Cyclo-core bits, Dust Exhaust Swivel, Power Unit, and Dust Collector. This method of removing the dust and steel cuttings resulting from dry-drilling of reinforced concrete is said to reduce friction and noise to a minimum. "Method A" is recommended for use in areas where dust and noise would be prohibitive, such as in hospitals, hotels, offices, institutions, food processing and industrial plants. Write the company at 55 Commercial St., Medford 55, Mass. for complete information.

Whitmire Has Pet Pest Series

A series of six separate sheets, suitable for display, one each on ticks, lice, chiggers, fleas, ear mites, and mange, is available free of charge from Whitmire Research Laboratories, 339 South Vandeventer, St. Louis 10, Mo.

Whitmire, manufacturers of aerosol products for the pest control industry, also has a line for the control of pet pests. Interest by PCOs in control of ectoparasites of dogs and cats has stimulated Whitmire to offer these informative sheets to pest control firms.

Dri-Die Pet Powder

Davison Chemical Co. is now introducing its Dri-Die silica-gel insecticide as Dri-Die Pet Powder, claimed to be effective for control of fleas on dogs and cats.

Distributors marketing the product for Davison are Neil A. Maclean Co., El Monte and Fresno, Calif., and Chapman Chemical Co., Memphis, Tenn., Palo Alto, Calif., and Portland, Ore.

Getz Field Model Blower

The small Getz Powder Blower now has a big brother. Called the Getz Field Model Blower, it is equipped with a rubber stopper and a hook which facilitates carrying it in tomato fields. For full information, write Getz Exterminators, Inc., 2234 Olive St., St. Louis 3, Mo.

Pesticide Label Laws Revision No. 1 Available from CSMA

Revision No. 1 of the "Compilation of Labeling Laws and Regulations for Hazardous Substances" prepared by the Chemical Specialties Manufacturers Association (PC, '60, pg. 46) is now available.

Prices for the Revision are $3.00 per copy for non-members, and $2.00 each for CSMA members, postpaid in the USA and Canada. Complete copies of the Compilation cost members $5.00, and non-members $7.00.

Checks should be sent to CSMA headquarters, 50 East 41st St., New York 17, N. Y.

Notebook

TIPS AND IDEAS FROM THE FIELD

Customer Pays Your Salary

By A. Pescop

We find it never hurts to remind our service personnel, particularly new recruits, how important it is to give our customers the best possible service and courteous consideration at all times. After all, it's the customer who in reality pays all our salaries.

Our major responsibility is to get rid of any existing infestations and to keep their premises free of trouble. Next our men must promptly cater to complaints. To do these two things well, servicemen must have enough know-how to eliminate trouble as well as the ability and finesse to pacify irate customers.

Every man on the job must have personal neatness and go about his work in an orderly fashion, cleaning up wherever his treatments have caused any dirt or messiness.

Probably the most important attribute our men must have is a good attitude. They need to reflect a friendly, understanding feeling toward each customer, making each problem our problem. Servicemen must be helpful and sympathetic and yet reflect a confidence in the work they are doing as well as in the company they are working for.

Are these pointers "old saws" to you? Maybe, but we've found they help remind our men of the important place our customers hold in the economic welfare of our business and their jobs.

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Eliminate **SPARROWS -**

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DDVP

DIMETHYL DICHLORO VINYL PHOSPHATE is now being used in sugar-based fly baits, as a phoracide in mushroom culture, for control of cigarette beetle in tobacco warehouses and for control of flies in horse stables. Because of its high toxicity in very low concentrations, and its relatively low toxicity to warm-blooded animals and lack of residue, experimental work is suggested in many fields of application, including fumigants for grain storage and as a toxicant in flycords. Promising results in the control of adult mosquitoes has been attained.

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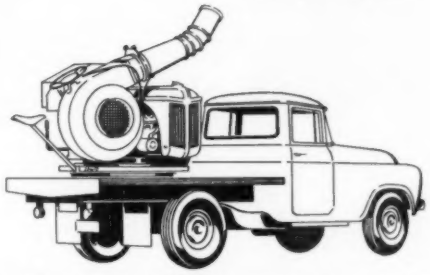

Hardie Model L-80A mounted on ¾ ton truck allows ample room for full day's supply of chemicals

Now is the time to do something about the insects and pests that will irritate everyone. Control them with the time-tested, full-coverage, high velocity HARDIE AERO MIST SPRAYER. Tested all over America and used by leading commercial insect control companies, the Hardie AeroMist is standard equipment for mosquito control; perfect for treatment of trees infested with bark beetle; (Dutch elm disease); gives matchless performance for control of bark beetles, leaf hoppers, leaf eaters, scale insects, fungus disease, and flies and mosquitoes. Air velocity 130 to 150 m.p.h. Perfect for mounting on the bed of a ¾ ton truck.

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When answering ads where box number only is given, please address as follows: Box number, c/o Pest Control, 1900 Euclid Avenue, Cleveland 15, Ohio.

Rates: "Position Wanted" 5c per word, minimum $2.00. All other classifications, 10c per word, minimum $2.00. All classified ads must be received by Publisher the 10th of the month preceding publication date and be accompanied by cash or money order covering full payment.

POSITION WANTED

PEST CONTROL SPECIALIST, refuse disposal engineer, and food storage and dispensing sanitation inspector, retiring from Technical Staff of major U. S. Air Force command, seeks employment in state, municipal, or industrial sanitation organization. Box 524, Pest Control magazine.

ENTOMOLOGIST, age 30, married, with six years experience, including management in all phases of pest control, seeks position with established, progressive firm. Box 525, Pest Control magazine.

HELP WANTED

A "CLOSER" capable of hiring and training men. Termite control field, or water softener. Relocating and getting-started expenses advanced. Box 526, Pest Control magazine.

OPPORTUNITIES UNLIMITED. The world's largest pest control organization (AAA-1 rated) has interesting openings for men with initiative and ambition. We operate in 28 states from coast to coast and there are opportunities open in many phases of our operation . . . servicemen, managers, technical representatives and salesmen. Experience in professions related to pest control helpful, though not necessary. Liberal salary and incentive arrangements provide unparalleled opportunities for men with good judgment and the ability to get along with people. Our firm, over 50 years old, offers employee benefits including paid vacations, sick leave, life insurance, hospitalization and pension plan. All replies confidential. Interviews in Atlanta by invitation at our expense. Write in detail to Orkin Exterminating Co., Inc., 713 W. Peachtree St., Atlanta, Ga. Attention: Personnel Dept.

FLORIDA certified pest control operator wanted for unusual opportunity in responsible position. All replies confidential. Interviews in Tampa at our expense. Terminix Company, 3432 South Dale Mabry, Tampa, Fla.

Answers to By Any Other Name on Page 68

1. B; **2.** E; **3.** A; **4.** H; **5.** C; **6.** D; **7.** K; **8.** I; **9.** F; **10.** J; **11.** L; **12.** G.

INSECTICIDE FORMULATOR desires aggressive representation in several key locations throughout southern states selling PCOs. Replies held in strictest confidence. Box 527, Pest Control magazine.

FOR SALE

EXTERMINATING CO. licensed in all phases, 1500 customers, Gulf Coast 200,000 population, booming city, $10,000 cash, principals only. Box 6517, Mobile, Ala.

WANT TO BUY

WILL PAY TOP PRICE for exterminating business in New York City area. Cash. Replies confidential. Box 439, Pest Control magazine.

MONTHLY PEST CONTROL accounts wanted in area of Monterey Park, Calif. J. Mechling, 771 Divina Vista, Monterey Park, Calif.

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Follow instructions on can for best results

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ECONOMICAL TO USE: Two ounces fumigates up to 6,000 cubic feet.

FUMO-KILL is truly the modern method of insect extermination. Light match to contents of can, will produce fumes—NO FLAME. Non-hazardous. This amazing FUMO-KILL insecticide has been tested, and found effective against most types of household pests.

This amazing FUMO-KILL insecticide is by all qualifications a leader in its field.

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FUMO-KILL can be obtained in 2 oz. (enough for up to 6,000 cubic feet)—4 oz. and 1-lb. cans.
Cost of 12—2-oz. Cans.....$ 7.50 per doz.
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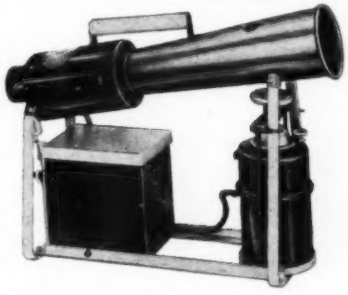

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GAS MASKS

Pestales

Short courses anyone? The popularity of university short courses is a tribute to the contributions they make, but the pressures put on professors is another subject, the popularity of which might be questioned. For example, the entomology staff at Purdue recently participated in **three** pest control conferences within the span of two weeks! A pesticide conference was held from January 25 through the 27th; then an insect detection seminar was given on Thursday and Friday, January 28 and 29. After a one-day breather, PCOs began to arrive for the six-day Purdue PCO conference starting January 31st. Some pest controllers arrived on Saturday, the 30th, for special meetings with entomologists Osmun, Deay and others!

* * *

Future looks bright for Walter Wilson's two boys who are both in college studying in fields that will prepare them well to join Dad in his Wilson Exterminating Co., Winston-Salem, North Carolina. Walter, Jr. is a senior at North Carolina State studying entomology, and Randy is a freshman majoring in business administration at Guilford College (Guilford, N. C.). The two sons work with Walter during their vacations from school.

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You have been seeing, hearing, and reading a lot about the new "prime" professional insecticide produced by Cook Chemical Company. Now Thompson-Hayward's vast distribution system puts warehouse supplies in 19 major cities.

Call the T-H office and warehouse nearest you for prompt delivery. Available in 5 lb., 3 lb. and 1 lb. sizes. Throw-a-way cylinders with the new lock-open fogging nozzle and free wall brackets for handy storage.

See the Cook Chemical Company announcement in this issue of Pest Control for complete product information.

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GENERAL OFFICES: KANSAS CITY, MISSOURI

THOMPSON-HAYWARD Chemical Company

Honors Received: During the Eastern PCO Conference, NPCA prexy Harold Schnorrenberg presented his association's Drs. Ralph E. Heal and Philip J. Spear certificates commending their outstanding contributions to the pest control industry. "Snowy" also gave F. E. "Pete" Bohman a special award of merit for his many contributions, throughout the years, to the Eastern conference's success. But turn about is fair play, so Harold was on the receiving end when members of the New England PCA and Eastern PCO Conference presented him with a silver bowl for his participation in the program.

* * *

Largest in British Isles. William H. Westphal, A. C. Farrington, and J. K. Course, all of Disinfestation Limited, with headquarters in London, England, were among the delegates to the successful First Arizona PCO Conference in Tucson, late in January. Bill Westphal reported his company does 50% of all the pest control work done in the British Isles. This overseas NPCA member lists 24 branch offices in the current association roster!

* * *

Honor Roll Additions: News of the passing of two more popular PCOs has just reached us. Michael Ballantyne, who operated Ballantyne Pest Control in Chicago, Ill., died on December 31st. And, Columbus H. Alexander, 59, for 19 years associated with Bruce Terminix, and owner of All-State Termite Control, Memphis, Tenn., died on January 11th after a long illness.

* * *

Dam pigeons owled. Pigeons are no longer a problem at McNary Dam on the Columbia River, thanks to phony owls that move and "growl". Recently army engineers placed life-size papier-mache owls, whose eyes glow in the dark, at strategic points along the dam. At the slightest vibration, the fake owls swing and emit the throaty purr of a hungry owl. The pigeons now seek other places to nest, we're told. Wonder how long it'll be before the birds wise-up and this control method will be so much water over the dam?

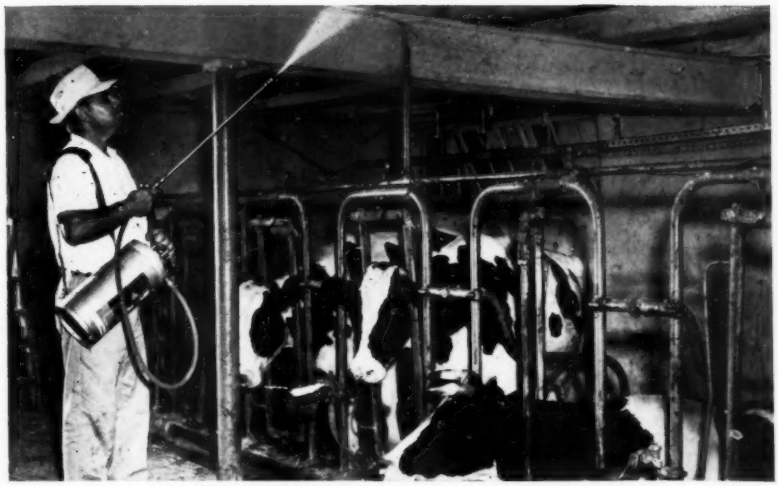
* * *

Lucile and Ron Hunt (Western Pest Control Service, Whittier, Calif.) were among the 15 Californians who attended the Arizona PCO short course, but the Hunts took a few extra days to see the sights. Ron writes that the exhibit of live animals in their natural habitat in the Arizona Sonor Desert Museum included live arthropods. Included were spiders, scorpions, centipedes, a large Cerombycid, and an aquatic Belastomid. Arizona U. entomology chief, Dr. Larry Carruth should have no trouble showing his students what venomous pests look like.

Fairfield Facts

DAIRY EDITION ★ ★ ★

FLY CONTROL MEANS BETTER MILK



ARE THESE COWS PROTECTED? Increased insect resistance in 1960 will make many once-successful insecticide formulations obsolete, emphasize researchers at Fairfield Chemicals, Food Machinery and Chemical Corp. Use of maximum-effectiveness insecticides containing Pyrenone assure animals of complete protection and prevent loss of farm income due to drop in milk quality.

Flies "Take Off" When Up Against Pyrenone and Crag Fly Repellent

Flies are finding it more dangerous lately to attack grazing animals. Not only is it proving more uncomfortable for the flies, but it's becoming downright fatal.

Farm use of insecticide and repellent combinations like Pyrenone* and Crag Fly Repellent† afford additional protection to grazing animals...protection that kills flies on contact and repels future attacks for several days.

Field tests show that sprays which depend primarily on repellents have limited value. Flies, gnats and mosquitoes stay in the area, bothering animals and attacking non-treated stock. When grazing cattle are annoyed by insects, quantity and quality of milk yields suffer.

To the farmer, milk loss means money down the drain, a sharp drop in profits. When cattle are busy battling biting insects they haven't time to graze properly. They take in less food and lose blood, energy and weight.

Versatile Pyrenone and Crag Fly Repellent combinations, available as oil sprays and water emulsions, are the answer. Highly effective, they are accepted under the Miller Bill on a "non-residue" basis. No trace of these approved formulations appears in milk or meat of treated animals. They assure maximum protection for greater milk output the year 'round.

*U.S. Pat. Off. FMC †U.S. Pat. Off. U.C.C.

Copies of the following booklets may be obtained from local Fairfield representatives or by writing to Fairfield Chemicals, Food Machinery and Chemical Corporation, 441 Lexington Avenue, New York 17, New York.

☐ TECHNICAL BULLETIN No. F-1 — Free bulletin describing Pyrenone and Crag Fly Repellent formulations.

☐ FAIRFIELD FACTS FINDER—a new, 20-page comprehensive guide and unique, revolving calculator covering Pyrenone base formulations for dairy, garden, home and industrial sprays, aerosols and powders as well as an index to insects and pests. Price—$1.00.

Pyrenone Formulations Keep Cows Contented As Flies Get Tougher

Formulators whose insecticides offer Pyrenone's maximum protection will get a greater share of farm business during 1960. Field tests prove that maximum control of biting flies means better milk—hence, more money for the farmer.

With flies becoming harder to kill every year, dairymen can't risk insecticides that lose their "punch." Entomologists reveal that in some areas last year, they changed formulations two and three times to maintain fly control. Non-toxic Pyrenone appeared in virtually every final successful insecticide.

Milk quality suffers when biting fly control is below maximum. In Illinois, during a May-June span, twelve herds not protected by an effective insecticide lost 13 to 14.8 percent in butterfat. A 1-percent piperonyl butoxide and 0.1 percent pyrethrins Pyrenone emulsion used twice a week in amounts of 10 to 15 ounces per cow brought butterfat back to normal in a month.

Effective Pyrenone formulations for sprays, emulsions, powders, etc., are included in a free booklet, "Dairy, Livestock and Cattle Sprays, and Dusts," available upon request.

☐ DAIRY SPRAYS—Free booklet describing Pyrenone formulations for sprays, emulsifiable concentrates, wettable powders, fogging sprays. Pyrenone and repellents, Pyrenone aerosols, cow bombs.

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Aldrin is alkali-stable, even when lime, cement and other building materials are present in the soil.

And, aldrin is economical. Small amounts go a long way, give effective protection for years.

Get more new business from builders who are sold with aldrin. Recommend aldrin for new construction. Both you and the builder will profit from the results.

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